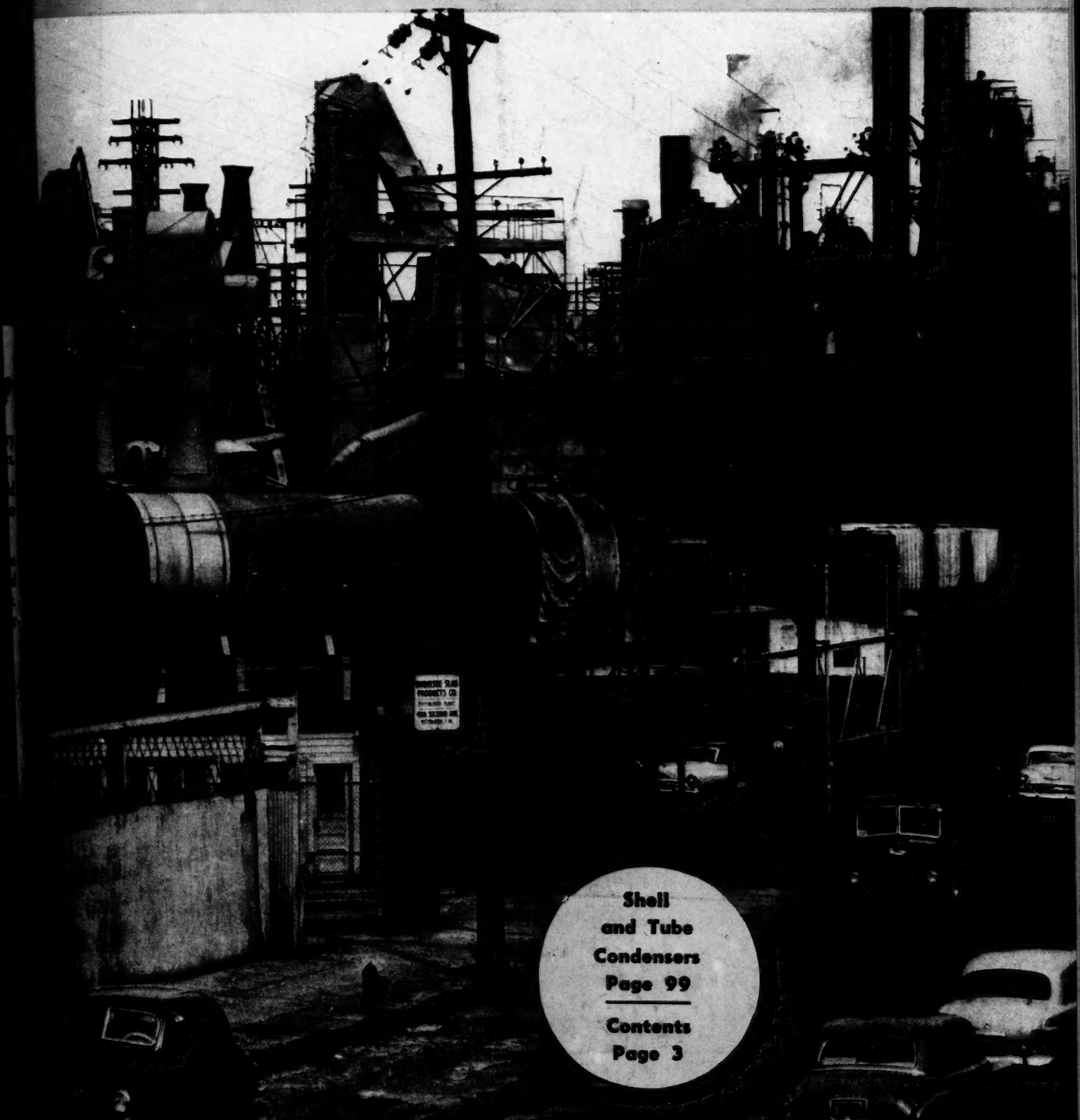
OCTOBER, 1954—51st YEAR

HEATING AND VENTILATING

INCLUDING AIR CONDITIONING — PIPING — REFRIGERATION — AIR SANITATION



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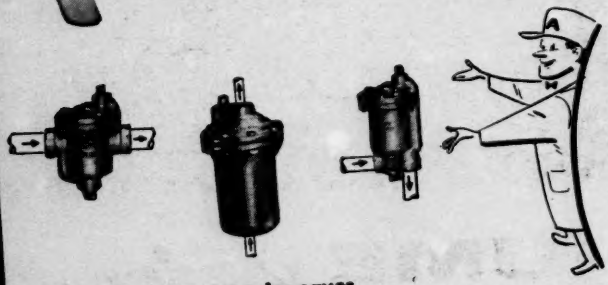
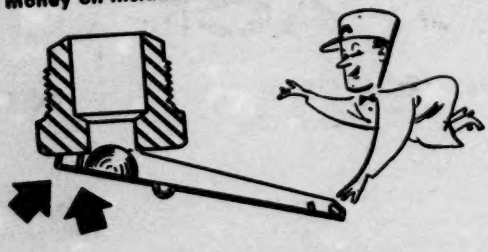
How Armstrong Traps Save you Money



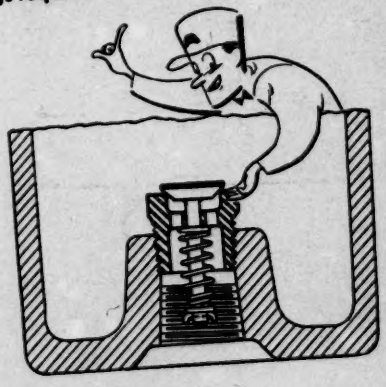
Choice of body styles saves money on installation costs.

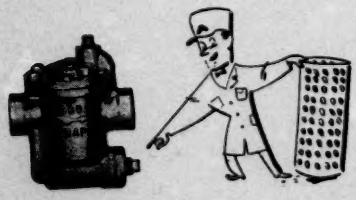
Hardened, ground and lapped valve and seat; stainless steel mechanism resists wear and corrosion—saves money on maintenance.



Two phase leverage means higher capacity in a smaller trap. Armstrong traps have optimum relation between leverage, valve travel, bucket weight, capacity and overall size.

This internal check valve saves labor and fittings required to install regular check valve.





This trap with built-in strainer costs less than separate trap and strainer—requires less labor and fittings to install.

Get the full facts on money-saving Armstrong traps. Send for free Catalog J. Clip and mail coupon today.

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Gentlemen: Please send me a free copy of Catalog J, The Armstrong Steam Trap Book.

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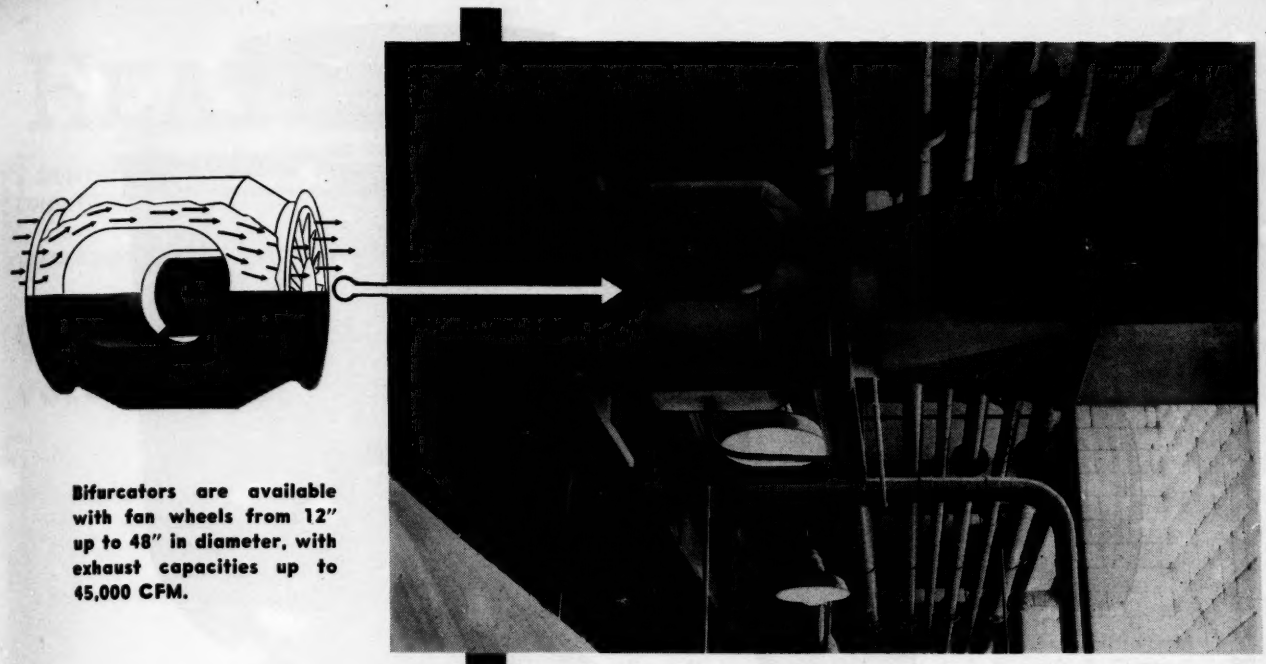
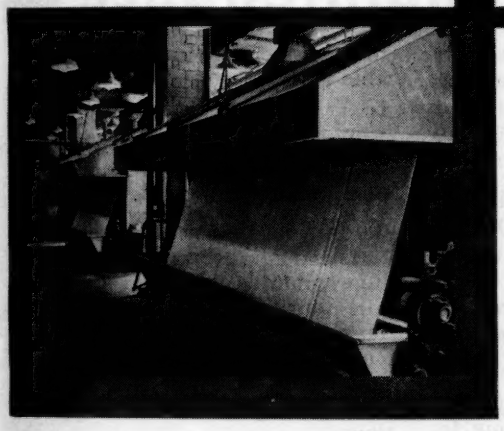


Bifurcators are available with fan wheels from 12" up to 48" in diameter, with exhaust capacities up to 45,000 CFM.

FUME *problem*... SPACE *problem*

BIFURCATOR® FANS SOLVE *BOTH* AT CLINTON FOODS INC.

Sulphur dioxide fumes from the starch filters are exhausted by Bifurcator Fans installed right in the ductwork.



In one manufacturing process at the Clinton, Iowa, plant of Clinton Foods Inc., starch filters give off sulphur dioxide fumes which must be exhausted. Choosing exhaust fans for this application, Clinton Foods' engineers had two major requirements. First, the fan motor must be protected from the fumes. Second, fan units must be very compact to fit into the limited space available.

DeBothezat Bifurcator Fans meet both these requirements ideally. The Bifurcator is a direct motor-driven fan in a divided housing. Its motor is in an isolated chamber around which fumes are by-passed, so that the motor stays cool, clean and accessible. A Bifurcator installs just like a flanged section of ductwork, and is scarcely larger in diameter than the ductwork.

The Clinton Foods plant now has 39 Bifurcators in operation, built of stainless steel to resist corrosion.

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Division of
American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

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Webster Radiator Trap installations customarily give from 15 to 30 years of satisfactory service. And a survey covering 16 installations and a total of 51,816 Webster Traps in service showed average length of service at that time to be 30.3 years.

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Webster Traps are available in 1/2", 3/4" and 1" sizes and in many body models. Choice of Diaphragm or Sylphon Bellows type.

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HEATING AND VENTILATING

A MONTHLY MAGAZINE FOR ENGINEERS AND CONTRACTORS CONCERNED WITH THE DESIGN AND APPLICATION OF AIR CONDITIONING, REFRIGERATION, PIPING, PLUMBING, AIR SANITATION, HEATING AND VENTILATION IN BUILDINGS

OCTOBER, 1954

VOLUME 51—NO. 10

The Cover: Shell and tube condensers are common in major industrial installations. See article on page 99 on use of such condensers in a refrigerating system.

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Washington News

LORING F. OVERMAN

IN a city accustomed to testing the political winds, the nation's somewhat unexpected building boom has not gone unnoticed. And fortunately for the heating, piping, ventilating and air-conditioning industries, Washington is leaving no stone unturned to make certain that the wheel keeps spinning in the breeze.

Money for constructon loans is to be kept as "easy" as possible. Construction of homes, commercial units, hospitals, schools, and community service facilities is to be encouraged. Utilities to supply new residential areas are being allowed for, and there are indications that gains in residential and related classifications will more than offset the slight drop-off in industrial building.

Residential Building Mushrooms

Principal reason why residential building is the fair haired boy is the fact that the physical shell of the housing unit is only the beginning. New housing is credited with being one of the major factors in the present high economic level of the nation, for the jobs created by new homes are legion. Consider what additional activities are required to complete and furnish a million residences—about the average per year for the last 10 years. Among the items needed each year would be:

1,000,000 kitchen sinks
13,900,000 windows
900,000 furnaces or heating units
11,600,000 doors
259,000,000 square feet of floor covering
940,000,000 square feet of finish flooring
1,100,000 lavatories
1,100,000 water closets
1,000,000 water heaters
10,200,000 squares of roofing
1,000,000 tubs and showers

The foregoing merely starts the list. It does not include such things as millions of bricks, billions of board feet of framing and finish lumber, millions of sacks of cement, tons of nails and hardware, and other tons of such products as insulation, refrigerators, ranges, air-conditioners, millions of miles of piping, wiring and ducts; and trainloads of furniture, drapes, venetian blinds, and so on down the line.

Added together, the residential building industry means employment for hundreds of thousands of people who work in factories, mines, and forests—plus the jobs created on the building sites and in the stores, yards and warehouses furnishing materials.

Whatever it takes to keep this tide of materials, labor and merchandising rolling, Washington hopes to be able to encourage. Of particular importance is easy financing—a factor which is making it possible for families to buy and furnish homes while they are still young enough to want all of the trinkets and gadgets now on the market. Even the automobile industry owes much to the housing boom, for rural living requires motor transportation—even two-car garages.

Two Million a Year

Two things are of importance to the heating, ventilating and air-conditioning industries in looking to future markets.

The first is the fact that residential air-conditioning is in its infancy. People who have become accustomed to working, eating, playing and going-to-church in air-conditioned comfort, are not going to tolerate uncomfortable homes.

How vast the residential market may be is suggested by the current forecast of the National Association of Home Builders. Pointing to the fact that a million homes have been absorbed each year for eight years, NAHB President Richard C. Hughes has estimated an annual need for two million "new or new-conditioned" homes.

The NAHB goal calls for 1,400,000 new homes annually—one million to be larger and even better in design and equipment than those produced in recent years. The next 250,000 should be well-designed small homes for low income families. And at least 150,000 additional rental units should be provided through slum clearance, Mr. Hughes believes. Over and beyond this new-house part of the NAHB program, "We can and should provide an additional 600,000 homes by new-conditioning and rehabilitating."

Mr. Hughes' forecast is based on the estimate that in the early 1960's, new families will be forming at the rate of 1,500,000 a year, instead of at the present rate of 750,000 a year. In the 1970's, according to Mr. Hughes, new families will come into existence at the rate of about two million annually.

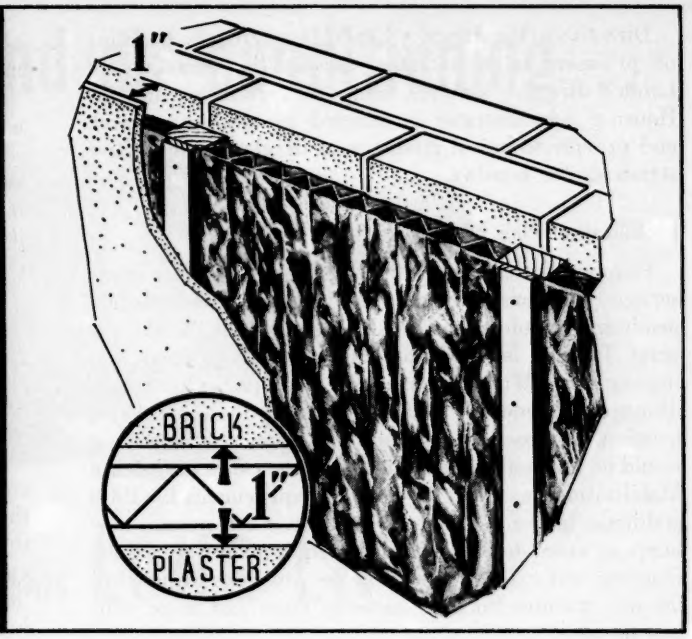
"That's a lot of families," said Mr. Hughes, "and that is why good, sound housing legislation is so essential in order that we can build new and improved housing at prices within their means."

Emergency Order Signed

Although looking to the construction industry to help with domestic problems, Washington is keeping its guard up insofar as national defense is concerned. In mid-September, President Eisenhower approved an order which focuses attention on problems which the country would face if an enemy were to attack. The order—issued by the Federal Civil Defense Administration—directs the heads of several government agencies to make plans to handle civil defense emergencies. Requests for standby programs were directed to the Secretaries of Agriculture, Labor, Commerce, the Attorney General and the Housing Administrator.

The Secretary of Agriculture, for example, is directed to offer guidance in connection with an emergency food reserve, and to develop a program to protect food and crops from biological warfare. The Secretary of Commerce is directed to provide guidance to state highway departments in the designation of state civil defense emergency highway routes. Included would be the control of movement on highways, and the clearing and repair of damaged highways.

How to Insulate Masonry Walls and Minimize Dampness and Heat Flow



MASONRY WALLS—brick, stone, cinder or concrete blocks—can be insulated against heat and vapor flow economically and effectively with 2 sheets of aluminum separated ½" apart by an accordion fiber. They can be attached in one operation to furring strips on the inside. Only ½" deep installed, they fit into the shallow 1" spaces created by the furring. The whole cost, material plus labor, should not exceed 7½¢ sq. ft.

In basements and other places in *existing* buildings with masonry walls, insulated areas can be created for active use for playrooms, storage, laundries, workshops, even living quarters, by the same technique of attaching multiple accordion aluminum and reflective spaces to furring strips.

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With respect to radiant heat flow, the aluminum surfaces have 97% reflectivity and only 3% absorptivity and emissivity. Low conduction results from the preponderant air spaces of low density. The layers of multiple aluminum and fiber retard inner and outer convection.

To obtain MAXIMUM uniform depth protection against heat loss and condensation formation, it is necessary to use the new edge-to-edge multiple aluminum*, each sheet of which stretches from joist to joist, and also all through the flanges for further vapor protection as well as permanent attachment of each sheet. ***Patent applied for.**

COST OF INFRA INSULATION PLUS LABOR

Type 4-S Jr.—7½¢ sq. ft.

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The tough, continuous aluminum sheets are almost impervious to vapor flow. Infiltration under the flat stapled flanges is slight. Condensation formation on or within the aluminum sheets is minimized by the scientific construction of multiple layers of full-depth accordion aluminum, fiber and air spaces. Available in pre-fabricated ½" depth, commercially known as Type 4 Jr. Infra Insulation.

HOW TO INSTALL

Attach 1" furring strips to walls on 16" centers. Tack flange of Type 4 Jr. to FACE of furring with staples, flat surface facing room. Nail rough lattice strips over flanges. This prevents contact with interior wall and creates additional air space. Finally attach wallboard, or lath for plaster.

The U. S. NATIONAL BUREAU OF STANDARDS has published an informative booklet describing the destruction condensation can cause and means of preventing condensation. It is entitled "Moisture Condensation in Building Walls." Send us coupon for a FREE copy.

Get a FREE SAMPLE of this unusual insulation. Check the box in the coupon.

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Directive to the Attorney General concerns the handling of prisoners in a bombing attack; the Secretary of Labor's directive involves manpower problems, and the Housing Administrator is directed to conduct research and provide technical guidance in developing protective standards for housing.

Mobilization Plan Marks Time

Planning for emergencies at the theoretical level raises serious questions in itself, but forecasting defense expenditures involving billions continues to baffle the experts. The task is something like asking an air-conditioning engineer, "What equipment will be required to air-condition a warehouse?" Without knowing the size, shape, location, purpose, climate, and structure, a firm answer would be impossible. Early this year, the Office of Defense Mobilization was asked to work out requirements for 1000 end-items in the event of all out war. Each month, new weapons antedate old ones; new requirements are superimposed over existing ones, and the problems of how big the war machine must be becomes more and more difficult to solve.

Coal Problem "Difficult"

How to ease the coal industry's slump is proving a puzzling problem for the interdepartmental committee named by President Eisenhower on July 16. The committee, including representatives of State, Defense, Interior, Commerce, and Labor Departments, was expected to present recommendations early in November. The recommendations were to have been submitted to a Cabinet Committee on Energy Supplies, as basis for a report to be made on December 1 in an effort to aid the coal industry.

It was hoped that the interdepartmental committee could come up with one or two recommendations for quick action on behalf of the coal industry, after which long range planning could be tackled. Preliminary hearings indicated that there may be no easy or rapid solution to the problem, although a preliminary report may suggest interim relief.

Among the interim plans under discussion are proposals to shift government procurement away from fluid fuels to coal; reduced freight rates on coal to make it more competitive, and special unemployment relief in the coal producing areas. How far these ideas will get is questionable, for some of them are not in accord with general national policy.

Meanwhile, the interdepartmental committee has agreed upon six basic fields for action. These involve government procurement policies, residual fuel oil, transportation, natural gas, exports, and research. Each of the topics introduces controversial cross currents, some because of competitive aspects; some due to national or international policy.

Government procurement, for example, could be changed only over the protests of oil and gas industries. The preferences of the government agencies concerned would also be a factor.

Proposals to curb imports of residual fuel oil—favored by the coal industry and considered by the interdepartmental committee—ran into objections from the Pentagon Petroleum Logistics Office. The Pentagon report warned of disturbed relations with friendly Western Hemisphere nations, possible endangering of U. S. oil supplies from this hemisphere, and the likelihood of higher prices as a result of curbing residual oil imports.

The suggestion that the Interstate Commerce Commission be asked to lower freight rates on coal would again inspire protests from competing fuels. And the possibility of quick action by ICC on such a proposal is considered very slight.

The next subject considered by the interdepartmental committee—natural gas—also involves competitive angles as well as political considerations. Coal producers considered it a blow, earlier this year, when the Federal Power Commission was directed by the Supreme Court to accept jurisdiction over independent producers and assemblers of natural gas offered for sale in interstate commerce. Coal producers reasoned that gas prices, had they not been subjected to regulation, would have risen to a point where fuel buyers would return to coal. The coal folks have since proposed that the Natural Gas Act be amended to exclude the production end of the business from FPC regulation. Politically, the question is considered too hot to handle.

Another suggestion—foreign aid financing for coal exports—is being considered, but a more difficult problem is how to persuade foreign nations to abandon exchange restrictions on American coal. Involved here is the overall foreign trade policy, for asking another country to revise its tariff regulations inevitably causes the country approached to ask for compensating adjustments.

Research offers some hope for a long-range solution of the coal problem, but it may be many years before results could be expected. Among projects already under study are powdered-coal turbines for locomotives, and mine gasification of coal.

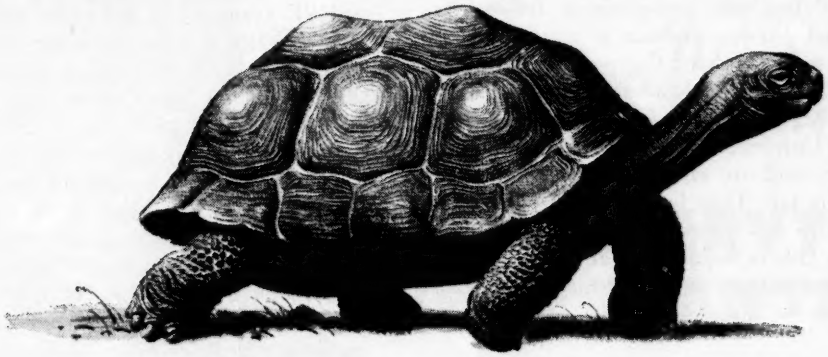
Washington Miscellany

Next Shortage—Water? Large users of water for cooling or other industrial purposes are being asked to consider methods of conserving the dwindling supply of H_2O. The subject has become one of increasing importance in recent years, resulting in the appointment by President Eisenhower of a Cabinet Committee on Water Resources Policy. Preliminary recommendations will be submitted to the President on December 1.

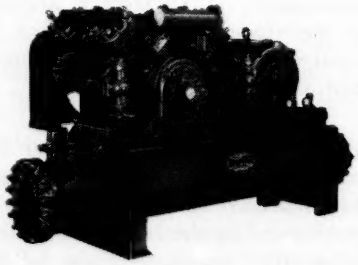
More Rural Customers. Two thousand new customers for electric blowers, air conditioners, refrigerators, oil burners and the like are provided for in three new loans announced by the Rural Electrification Administration. The loans, totaling $7.8 million, are for electrification projects in Colorado, Iowa and Mississippi.

Weather and Efficiency. How industrial efficiency is affected by such weather conditions as wind, fog, snow, humidity, etc., is reported in a new series of Air Force studies entitled "Climatic Criteria Defining Efficiency Limits for Certain Industrial Actvities." Based on research conducted in the U. S. and Canada, the studies examine the effects of weather conditions on such industrial activities as communications, operating parts, equipment, fuels and lubricants, plant structures, supply and delivery, accident rate, time schedules, efficiency, and safety.

in refrigeration and air conditioning...

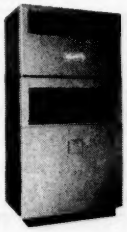


SLOW SPEED *means* LONG LIFE



BRUNNER CONDENSING UNITS
— for commercial refrigeration and air conditioning applications are available in sizes from ¼ H.P. to 75 H.P.

SELF-CONTAINED AIR CONDITIONERS
— completely packaged, easy to install and operate, are supplied in various models in sizes from 2 H.P. to 20 H.P.



Why does the turtle live so long?

From an engineering viewpoint, the answer would probably be "Slow Speed!" Because the speed with which things *move* has a vital effect upon their life and usefulness, the design engineer is *always* concerned with doing *more* work with *less* motion.

BRUNNER slow-speed COMPRESSORS are good examples of this principle. Because they operate at speeds much slower than other compressors of the same capacities, Brunner Compressors deliver full capacity refrigeration and air conditioning with *less* costly motion — *less* wear on working parts, *less* maintenance required — and *lower* operating costs, too.

Brunner Application Engineers are glad to make recommendations. If you're planning to change or add to your line, investigate Brunner—for more Refrigeration and Air Conditioning profits for you. Write —

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The Brunner Co., Gainesville, Ga.
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BRUNNER SINCE 1906

means dependable refrigeration

BRIEFLY STATED

• Establishment of two new post-graduate fellowships for engineering and physics students is announced by Minneapolis-Honeywell Regulator Company in a further expansion of its nine-year-old fellowship program with universities and colleges. The new fellowships have been set up with Purdue University and Tau Beta Pi, honorary engineering society, and are effective with the start of the school term this fall. They bring to seven the total number of fellowships now offered by the automatic controls manufacturer. Others include two at the University of Minnesota and one each at the Massachusetts Institute of Technology, Missouri and Iowa State.

• The appointment of Joseph D. Loveley to the new post of vice-president in charge of engineering of the Airtemp Division, Chrysler Corporation, has been announced by the company. A chemical engineering graduate from the University of Detroit in 1934, Mr. Loveley joined the Chrysler Corporation the following year. He was appointed chief engineer, his most recent assignment, in 1950.

• William M. Vidulich of Fairlawn, N. J., has joined the headquarters staff of The American Society of Heating and Ventilating Engineers to direct the Society's public relations, publicity and promotion activities. In assuming this position with ASHVE, Mr. Vidulich leaves Oildom Publishing Co., Bayonne, N. J., where, since 1950 he has been advertising and sales promotion manager of Fuel Oil News, a national trade publication serving the automatic oil-heating industry. Prior to 1950, Mr. Vidulich was associate editor of the Official Bulletin of the Heating, Piping and Air Conditioning Contractors National Association, New York.

• Three promotions, filling newly created posts, are announced by Airtemp Division, Chrysler Corporation. Those named to new positions are E. Palmer, room air conditioner advertising and promotion director, and F. J. Koehnen, Jr., and A. J. L. Moritz, Jr., who were elevated to corresponding posts in the commercial and residential markets, respectively. Mr. Palmer joined Chrysler in 1948, and earlier this year was made national sales promotion manager. Mr. Koehnen joined Chrysler in 1953, after having been associated with Aqua-Therm, Inc. Mr. Moritz joined Chrysler in 1951, and has served as a district manager.

• The development of a new structural material for bonding fiberglass, which will produce laminates and tubular products of superior strength is announced by the Bureau of Ordinance. Instead of the conventional method of bonding fiberglass with resins and organic materials, the new methods combine metals and inorganic substances, or combinations of both. The Bureau believes that the new material should have important commercial application and is seeking industrial participation in the further development of the new material and in the determination of its uses.

• Announcement has been made of the appointment of Charles H. B. Hotchkiss of Ridgewood, N. J., as editor of the Journal of The American Society of Heating and Ventilating Engineers. Mr. Hotchkiss will also edit the ASHVE Transactions and other technical buletins. From 1930 to 1940, Mr. Hotchkiss served as editor of HEATING AND VENTILATING after having been an assistant professor at Pennsylvania State College from where he received his B.S. and M.E. degrees. He left Pennsylvania State College to teach heating and ventilating at Purdue University from 1925 to 1930. In 1940 he became vice president of Ameresco, Inc., New York, which specialized in exporting heating, air conditioning and other engineering equipment. In 1950 he organized Endeco, Inc., which engaged in work on top classified subjects related to radar and sound transmission devices. For the past two years he has been with H. K. Ferguson Co., working in New York on large industrial plant design and construction of a Canadian project.

• The Association of Applied Solar Energy will sponsor a World Symposium on Applied Solar Energy to be held in Phoenix, Ariz., during November 1955. The symposium will be supplemented by a solar engineering show at which will be exhibited machines, devices, and methods demonstrating the various means of utilizing solar energy.

• An increase of 35.9% in the shipments of room air conditioners by manufacturers during the first 6 months of 1954 over the first 6 months of 1953 has been announced by the Air-Conditioning and Refrigeration Institute, Washington, D. C. Over a million units were shipped by manufacturers during the first six months of 1954, compared with 782,066 units shipped during the same period of 1953.

• A new, intensified one-day I-B-R Course designed to help contractors boost their sales with a baseboard heating system competitive in price with warm air systems, has been announced by the Institute of Boiler and Radiator Manufacturers, sponsors of the I-B-R Schools of Modern Heating. The course will provide complete, detailed instructions for the calculation and design of a series loop baseboard heating system that can be installed competitively with warm air systems and still produce all the advantages of forced hot water heating. Instructor for the course, which is scheduled for 8 different locations and dates, will be Arthur Wales, I-B-R field training director.

• Dr. Maria Telkes, physical chemist in the research division of the College of Engineering of New York University and widely known authority on solar energy utilization, has been named a consultant to Stanford Research Institute. A native of Budapest, Hungary, Dr. Telkes received her doctorate from Budapest University and was an instructor in physics at Budapest before coming to this country. For thirteen years she was a research associate at Massachusetts Institute of Technology, where she developed a solar heat storage method for houses. During World War II, while attached to the Office of Scientific Research and Development, she devised a solar still for life rafts.

Have you seen the new Nesbitt Series C unit heater?

IT'S GOT EVERYTHING WE'VE WANTED...

FREE-STANDING

"Nesbitt's new Publication 403 just arrived and it shows their complete line of deluxe cabinet unit heaters . . . and, Boss, they sure are beauties! Why,—"

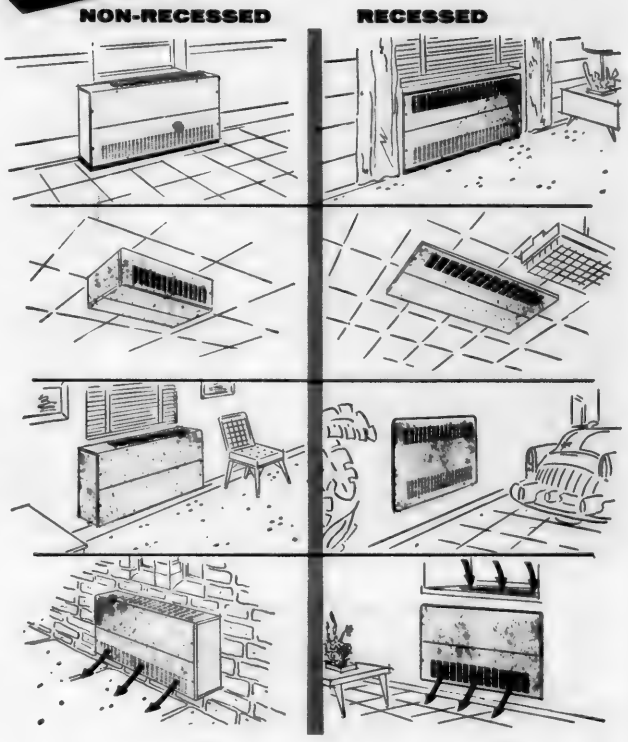
"Yes, Harry, I—"

"you know, Boss, this is the most flexible line of unit heaters I've ever seen. What a range of capacities—in both steam and hot water! The small direct-drive unit handles from 269 to 413 c.f.m. and gives from 17,700 to 35,100 B.t.u. per hour. The larger belt-drive units, with two to five fans, range from 342 to 1885 c.f.m., standard air, and from 24,000 to 148,000 B.t.u.—"

"Yes, Har—"

"But best of all, Boss, you can mount them any way you want—floor, horizontal, wall, or inverted—and free-standing, semi-recessed two ways, or fully recessed. The discharge or intake can be face, top, or bottom—direct or with ducts. The casings have fronts that conceal the rough opening to save plastering headaches. And you know Nesbitt construction!—I think these are just the units we need for that new—"

"HARRY! I've been trying to tell you . . . I received the new publication, too, and I've already sent you a memorandum to use Nesbitt Series C's on the terminal job!"



Nesbitt SERIES C DELUXE CABINET HEATERS

Manufactured and Sold by John J. Nesbitt, Inc., Philadelphia 36, Pa. • Send for Publication 403

BARBER COLMAN

REMOTE BULB AND ELECTRONIC

Hot Water Controls

Complete range of outdoor reset control systems available for any building...residence to skyscraper!

ADJUSTABLE RATIO TWO-POSITION CONTROL
Adjustable ratio, outdoor reset, two-position control provides on-off operation of burner to vary supply water temperature in accordance with outdoor temperature. Control components housed in cabinet, ready to install.

OUTDOOR ADJUSTER
Used with either two-position or proportioning adjustable ratio bulb controls for resetting control point in proportion to changes in outdoor temperature. Optional pump cutoff switch.

ADJUSTABLE RATIO PROPORTIONING CONTROL
Positions a Barber-Colman proportioning motor-operated valve to vary supply water temperature in accordance with outdoor temperature. Metal cabinet.

DUAL BULB THERMOSTAT
One bulb installs in boiler water, other outdoors. Eliminates excessive over- and under-shooting.

DUAL BULB PROPORTIONING THERMOSTAT Control point varies with outdoor temperature. Positions proportioning motor-operated valve.

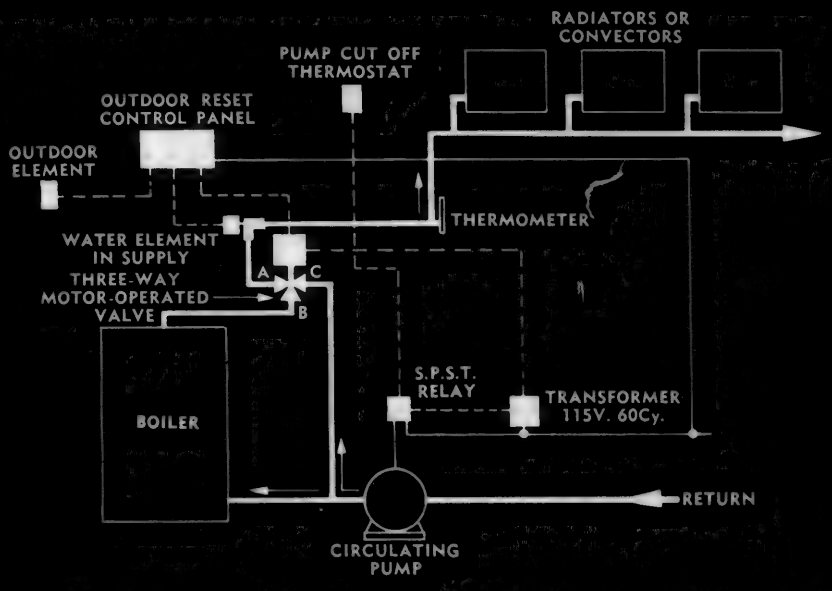
New variety! *New* flexibility! *New* adjustability! Overcome "lag"

Wonderful comfort for occupants of *any* building is possible today with Barber-Colman's versatile, flexible, economical, outdoor reset, hot water controls. You maintain a continuous, even flow of heat regardless of weather changes. You prevent over-and undershooting. You can specify night depression with morning warm-up. From advanced Barber-Colman developments, you can select dual bulb, adjustable ratio remote bulb, electronic, or any combination of types to meet job requirements in the best possible way.

NEW DATA BULLETINS NOW READY

Mail request, or phone nearby Field Office for complete kit of up-to-the-minute literature on latest developments in automatic hot water heating control.

TYPICAL OUTDOOR RESET CONTROL SYSTEM FOR CONVECTORS

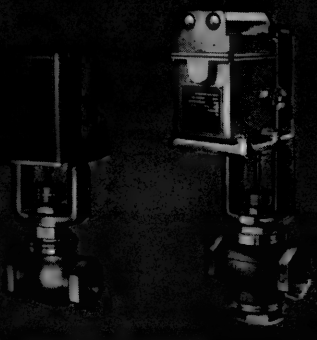


ADJUSTABLE RATIO ELECTRONIC CONTROL PANEL

...proportioning electronic panel positions ... motor-operated valve to vary supply ... temperature in accordance with out... temperature. Extremely sensitive. Here ... finest electronic hot water control on ... All adjustments on legible, easily ... dials. Easy to install and operate.

ADJUSTABLE RATIO TWO-POSITION ELECTRONIC PANEL

Provides on-off operation of burner to vary boiler water temperature in accordance with outdoor temperature. Sensitive, flexible—the ultimate in modern design.



MOTOR-OPERATED VALVES

Available in wide range of sizes and types—two-position for zone control—proportioning single-seat type for converter steam supply—proportioning three-way for controlling boiler water supply.

IMMERSION ELEMENT

OUTDOOR ELEMENT

NIGHT DEPRESSION WITH MORNING WARM-UP

NEW "PRIMER" ON ELECTRONIC CONTROLS

Removes mystery from electronic controls. Explains fundamentals. Illustrates applications. Complimentary copies now available for architects, engineers, contractors.

BARBER COLMAN

REMOTE BULB AND ELECTRONIC

Hot Water Controls

BARBER-COLMAN COMPANY, ROCKFORD, ILLINOIS

Automatic Controls • Air Distribution Products • Industrial Instruments
Aircraft Controls • Small Motors • Overdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

BARBER-COLMAN COMPANY
Dept. J, 1302 Rock St., ROCKFORD, ILL., U.S.A.
Field offices in principal cities

☐ Send free kit on modern hot water control systems
☐ Send free copy "The Electronic Control Story"

Name_____

Firm Name_____

Address_____

City_____ State_____

One of Chicago's newest and finest apartment buildings shows

How to give your clients a new concept of indoor weather

Honeywell Customized Temperature Control is becoming a "must" in all types of modern buildings

In building design, in kitchen facilities, in picture windows and a hundred other ways—the new apartment building rising at 1000 Lake Shore Drive in Chicago will offer tenants the finest in modern city living.

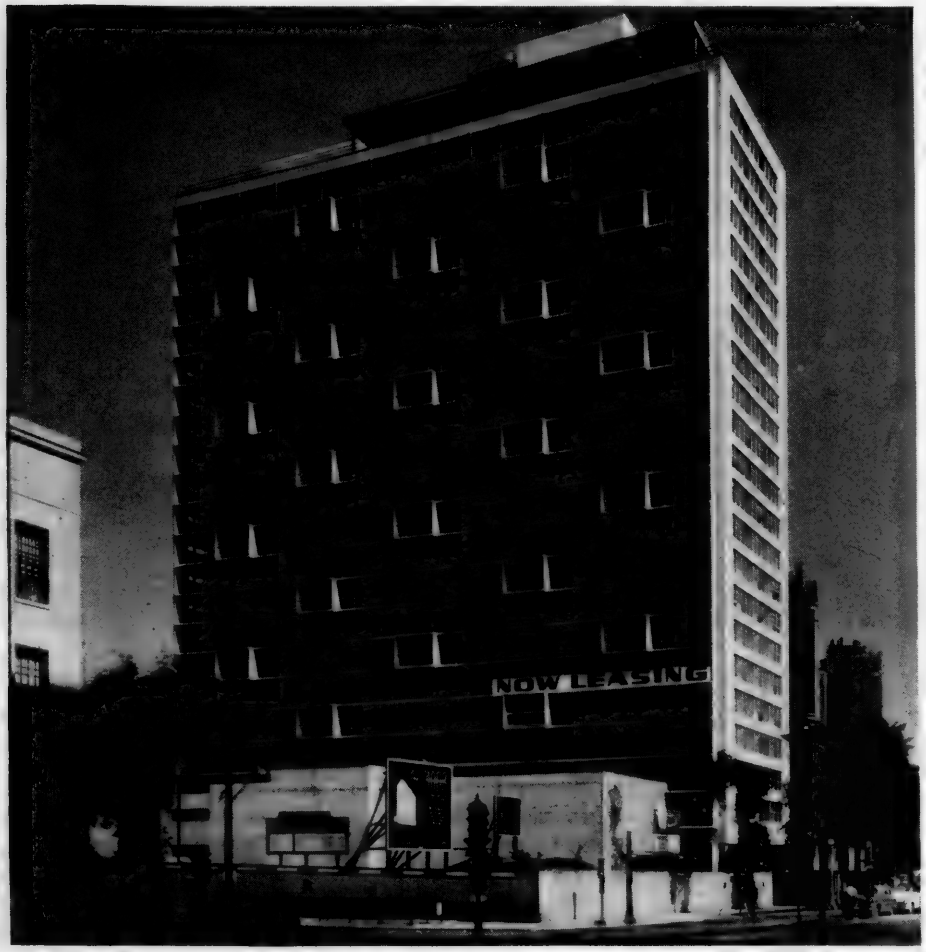
And in keeping with this tradition of the finest, heating comfort will be assured by a Honeywell Customized Temperature Control installation. This will take the form of Individual Apartment Temperature Control. Each apartment will have one or more thermostats, as the floor plan indicates.

The story, in brief form, of the Honeywell Customized Temperature Control installation in the new 1000 Lake Shore Drive Apartments in Chicago is told by the pictures and captions on these two pages.

The *techniques* used, applied to your particular problems, can help you give clients the indoor Weather they've always wanted—customized to their requirements.

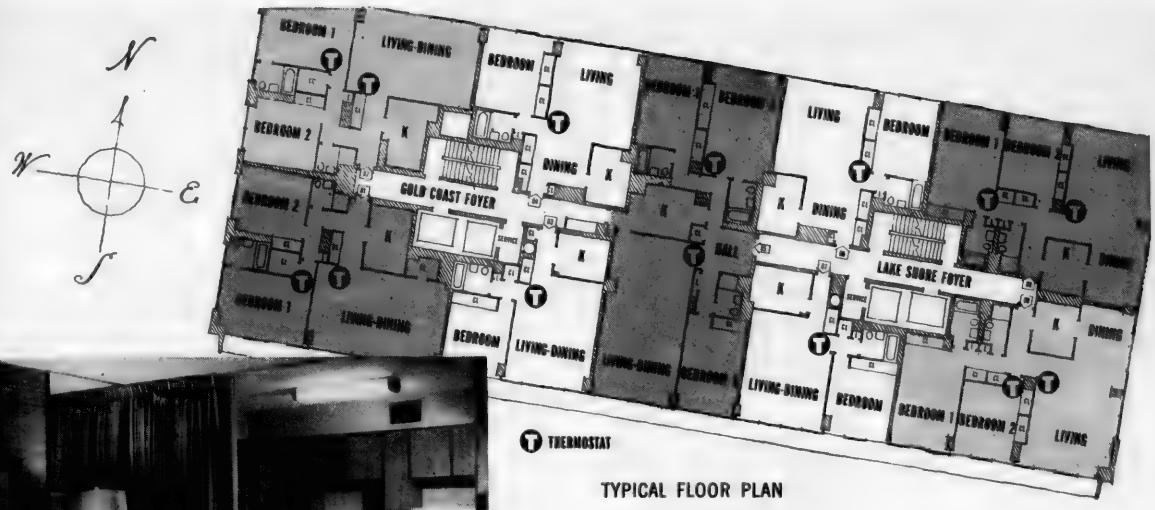
The key word here is "customized." It means that whatever your clients' control requirements, a Honeywell Customized Temperature Control installation *designed to fit the needs of the building and its occupants* is your answer. This applies not only to heating and cooling, ventilating and humidity control, but to industrial control as well.

Only Honeywell can provide true "customized" control. Because only Honeywell manufactures the three types of controls—pneumatic, electric and electronic—needed for an integrated system.

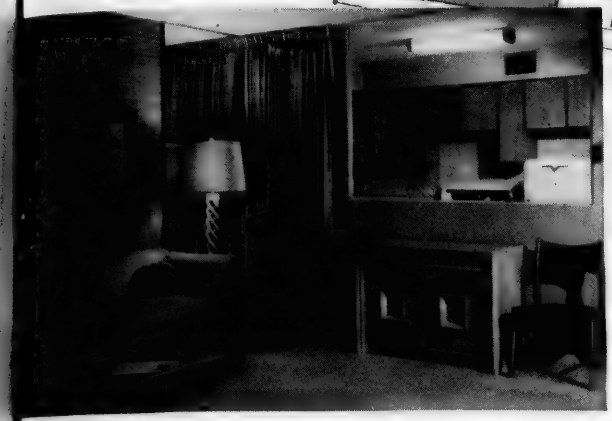


Comfort going up. Uncompleted exterior of new 1000 Lake Shore Drive Apartments in Chicago. Harold L. Perlman, Sponsor; Sidney H. Morris & Associates, Architects and Engineers; William Goodman, Mechanical Engineer; Plonsker Engineering Company, Heating Contractors.

Sculpture on Lake Shore Drive exterior wall, "Gold Coast" by Bernard Rosenthal



TYPICAL FLOOR PLAN



Living area comfort. Comfort in the living areas is controlled by an individual thermostat in each apartment, as the floor plan shows. Tenants select the temperature *they* like, don't have to put up with an unsatisfactory average building temperature that satisfies practically nobody.

Sleeping area comfort. In the larger apartments, having two exposures (see floor plan) there's a *second* thermostat in the sleeping area. This enables tenants to maintain a second, cooler temperature in the bedrooms for more healthful sleeping. And with one or two thermostats in each apartment, tenants on the north are just as comfortable as those on the south —no matter how bitter the winter winds.

For comfortable, even temperature in new or existing buildings— of any size—specify Honeywell Customized Temperature Control

Whether it's an apartment, office, school, shopping center, factory, motel, hospital—or any size building —new or existing, Honeywell Customized Temperature Control can help meet your clients' heating, ventilating, air conditioning and industrial control problems.

Your clients will not only enjoy more comfort and efficiency, they'll save fuel, too.

For full facts on Honeywell Customized Temperature Control, call your local Honeywell office. Or mail the coupon today.

Harold L. Perlman, sponsor of 1000 Lake Shore Drive Apartments, says:

"We expect our new building to be one of the finest, most comfortable places to live in Chicago. Certainly Honeywell Customized Temperature Control will contribute importantly to that."

MINNEAPOLIS
Honeywell

First in Controls

112 OFFICES ACROSS THE NATION

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
Dept. HV-10-192, Minneapolis 8, Minnesota

Gentlemen:

I'm interested in learning more about Honeywell Customized Temperature Control. For a new building ☐ For an existing building ☐

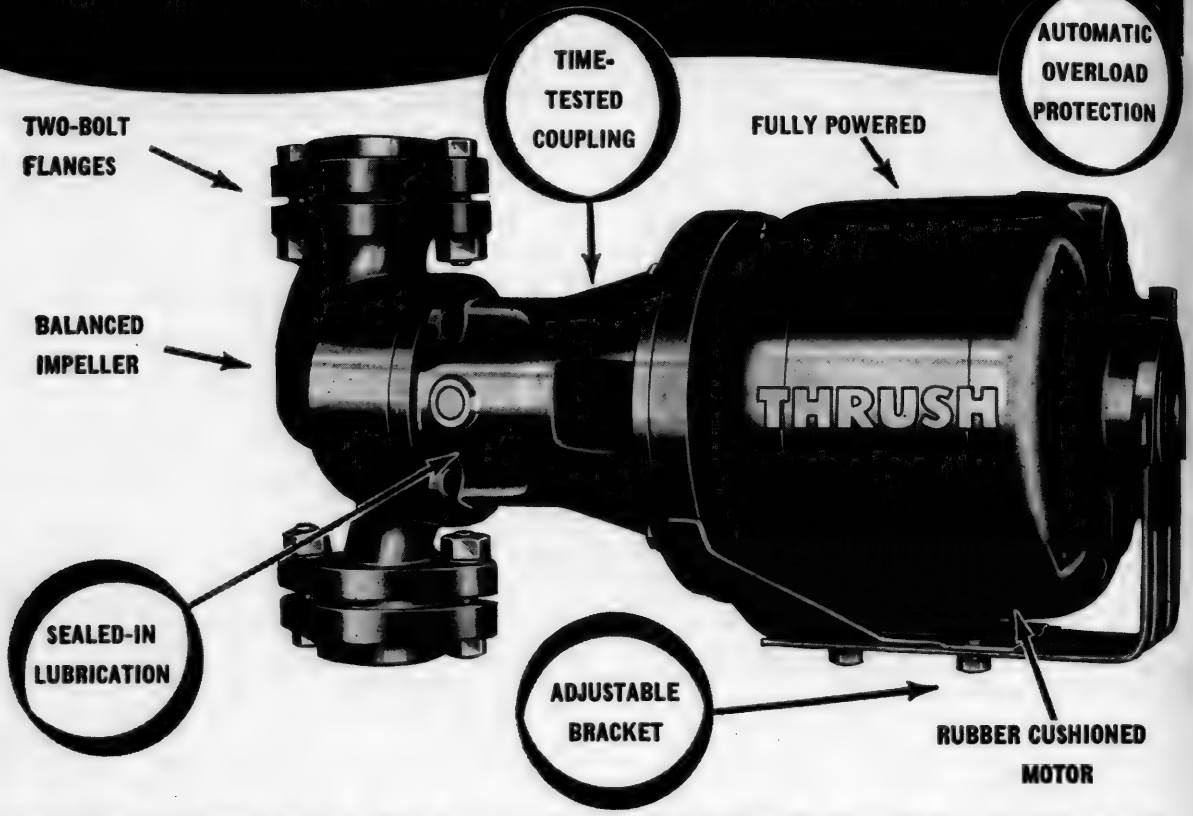
Name .....

Firm Name .....

Address .....

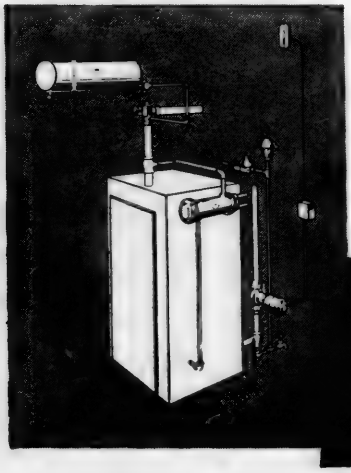
City ..... *Zone* ..... *State* .....

IMPROVED! to give you more Circulator for your money



QUIETER • GREATER CAPACITY • RUGGEDLY BUILT • COMPACT

FOR REAL dependability and fine performance choose Thrush Water Circulators. Time-tested design, improved in efficiency, increased in capacity, with job-rated power for each size . . . Thrush offers the greatest value per dollar in Circulators today.



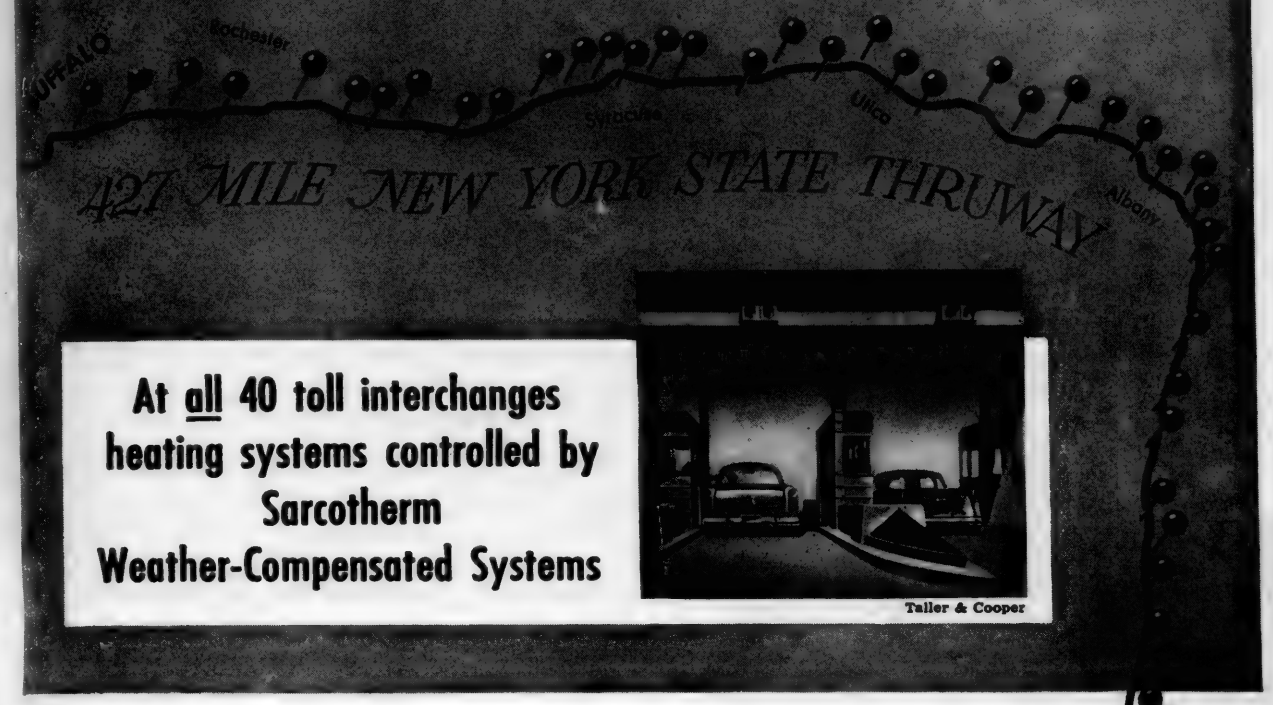
The rubber-cushioned motor mounting eliminates noise and vibration. The adjustable bracket makes motor change easy. The patented spring coupling transmits power evenly. It's trouble-free. Lubrication is sealed in . . . with double seals that rarely if ever need replacement.

See your wholesaler today or write Dept. D-10.

H. A. THRUSH & COMPANY • PERU, INDIANA

THRUSH Water Circulators

From New York to Buffalo ...it's Sarcotherm at every point



At all 40 toll interchanges heating systems controlled by Sarcotherm Weather-Compensated Systems

Taller & Cooper

HERE IN EFFECT is a heating system which stretches from the southeastern to the northwestern extremities of New York State.

It is obvious, therefore, that such a system must be so simple, so fool-proof, so utterly dependable, that any possibility of breakdown or other trouble will be reduced to an absolute minimum.

That is why *reliability* received so much attention from the Thruway's heating engineers. And that is one of the principal reasons why Sarcotherm Weather-Compensated Control Systems are installed in all 40 toll interchanges.

Advantages of Sarcotherm Systems

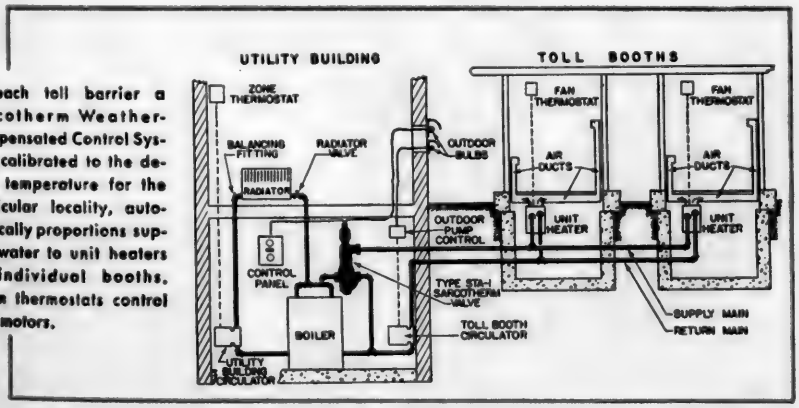
Easy to install — tailor-made drawings and diagrams of the complete system are furnished for each job.

Easy to maintain — by regular maintenance men, because of simplicity; fewer parts, such as transformers, relays.

Easy to adjust — to any desired setting.

Complete control system — including all specialties such as radiator valves, balancing fittings — all from one manufacturer, Sarcotherm. Unit responsibility.

On the job assistance — to contractors from Sarcotherm's field engineers.



At each toll barrier a Sarcotherm Weather-Compensated Control System, calibrated to the design temperature for the particular locality, automatically proportions supply water to unit heaters in individual booths. Room thermostats control fan motors.

SARCOTHERM CONTROLS, Inc.

Empire State Bldg., New York 1, N. Y.

An affiliate of Sarco Company, Inc.

4002-C

Weather-Compensated Control Systems for **HOT WATER, RADIANT AND STEAM** *Heating*

FORD'S *Most Modern*

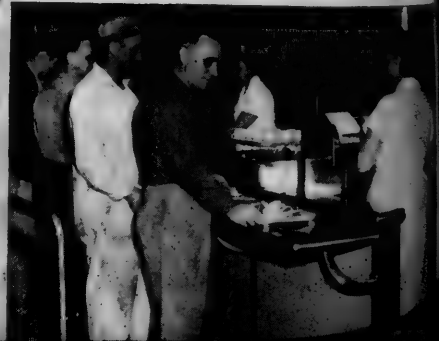
Above workers in **Cushion Department**

Length of Plant is 1500 feet. Width is 900 feet.

Chassis Line or sometimes called the "Build-up" is the portion of the Assembly Line where the completed engine, brakes, springs and many other items are assembled to the frame.

Motor Line is an example of team work in action. Shown above are three men working on the same engine. One is installing the wiring while the other two are attaching an automatic transmission.

Body Drop (right) is where two assembly lines meet. A trimmed body is lowered on a chassis and becomes the Final Line.



Comfort of employees in the modern **Cafeterias** is assured by Powers Control

POWERS CONTROL

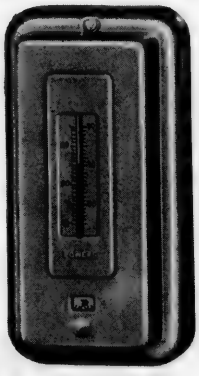
- INCREASES PRODUCTION
- IMPROVES MANY PRODUCTS
- INCREASES OUTPUT OF EMPLOYEES
- REDUCES HEATING COSTS

Auto Assembly Plant Equipped with a

POWERS Pneumatic System of TEMPERATURE CONTROL

LINCOLN-MERCURY PLANT
WAYNE, MICH.
Architects and Engineers: GIFFELS & VALLET
Contractor: LORNE PLBG. & HEATING CO.

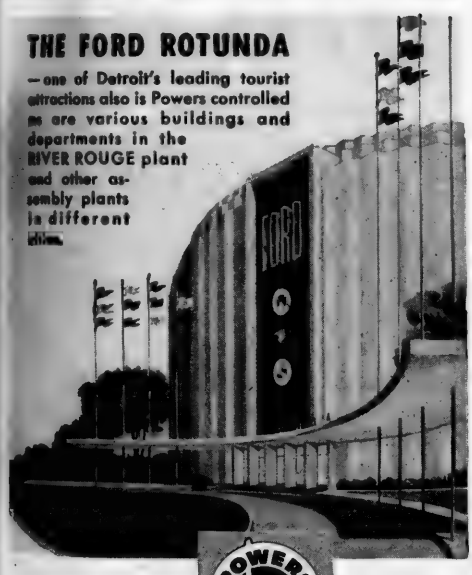
Comfortable, Even Heat at the Right Temperature for each department helps improve efficiency of employees and results in



- **Increased Production**
- **Better Products**
- **Lower Heating Costs**

—these are some of the year after year dividends THE FORD MOTOR CO. will receive from its investment in Powers control.

THE FORD ROTUNDA
—one of Detroit's leading tourist attractions also is Powers controlled as are various buildings and departments in the RIVER ROUGE plant and other assembly plants in different cities.



With its almost 1,500,000 square feet of floor space, nine miles of conveyor lines and many advanced features this ultra modern LINCOLN-MERCURY plant is the last word in efficiency. It is a show place among assembly plants.

Into its receiving docks come some 4800 separate parts (with an entire engine as one part). Out of its delivery door, at the rate of 300 cars per 8 hr. day, go completed automobiles tested, checked and ready for driving.

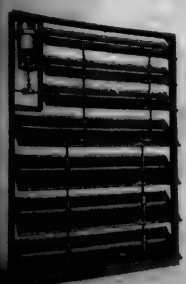
Here a Powers pneumatic control system regulates the steam heating used in the assembly and manufacturing areas and the conditioned air in the paint spray department, first aid and hospital room, cafeterias and administrative offices.

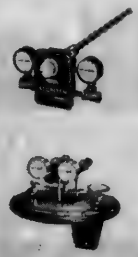
Experience gained by Powers here and in many other important large and small buildings may be helpful to you. When problems of temperature or humidity control arise, contact our nearest office. There's no obligation.

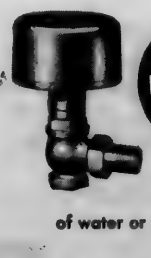
THE POWERS REGULATOR CO.

Since 1891 — SKOKIE, ILLINOIS • Offices in Over 50 Cities • See Your Phone Book

'53 (b27)

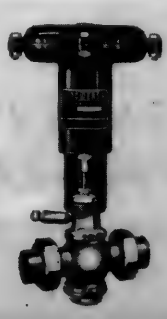






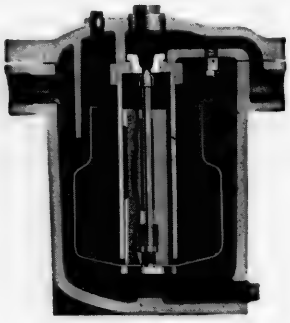
POWERS **PACKLESS** VALVES

. . . eliminate packing maintenance, leakage of water or steam, or loss of vacuum.



snap action

ELIMINATES STEAM WASTE



illinois

STEAM TRAPS

SIMPLE — EFFICIENT — DEPENDABLE

The valve action of an Illinois trap is instantaneous. It is either wide open or tight shut. Wire drawing is impossible. The valve stem travels independently of the bucket—no other trap has this feature.

Here are some "reasons why" of Illinois' outstanding popularity:

SIMPLE—moving parts are valve and bucket only, all motion vertical...**CANNOT AIR-BIND**—continuous air venting through thermostatic air vent—no steam loss...**CANNOT BLOW STEAM**—valve always water sealed...**NO LEAKAGE AT REDUCED PRESSURE—NO LEAKAGE AT REDUCED RATE OF FLOW**—at any point in the range...**NO CHATTERING DURING FLOOD CONDITION**...**SURFACE DISCHARGE**—flushes out all grease and sludge...**VALVE AND SEAT**—hardened steel alloy...**INSPECTION EASY**—without disturbing piping...**DRAINS CONDENSATE EQUALLY WELL**—from compressed air lines, air separators, air after-coolers, gas mains.

Sizes from ½ inch to 2 inches and pressures from 5 psi up to 250 psi.
Extra heavy duty steel bodies for pressures up to 600 psi.

ILLINOIS ENGINEERING COMPANY

illinois ENGINEERING

2045 SOUTH RACINE AVENUE • CHICAGO 8, ILLINOIS

DIVISION OF AMERICAN AIR FILTER COMPANY, INC.

Parker-Kalon

DAMPER CONTROLS, METAL PUNCHES AND FILE HANDLES

Now Made by DURO-DYNE

"Unold" Quadrant

"O.X." Metal Punch

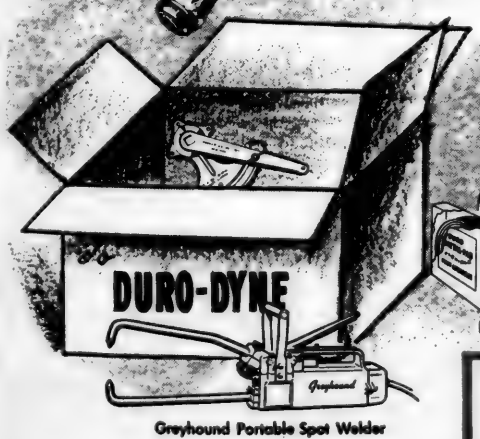
"X.X." Metal Punch

Dial Regulator

"Ally" Regulator

"Shur-Grip" Solder Iron Handles

"Shur-Grip" File Handles



Greyhound Portable Spot Welder

We've been doing a lot of handshaking
Accepting congratulations on our big, new addition—
The entire PARKER-KALON line of "OX" and "XX" Metal Punches
The entire PARKER-KALON line of Damper Regulators and Controls
"Shur-Grip" File Handles and Solder Iron Handles
Plus a terrific team of the best distributors
In the Sheet Metal, Air Conditioning, Heating and Ventilating Fields.

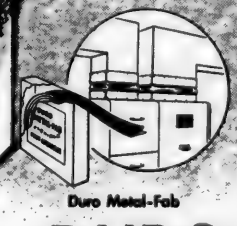
These P-K products will remain the same—
Same in quality, appearance and performance—
Same deliveries—same guarantees.
No changes at all, except that
We, of DURO-DYNE, will manufacture and sell.

Are we qualified? You bet your life we are!
As manufacturers of revolutionary new products
Which eliminate costly steps in sheet metal fabrication,
We have the "know-how," experience and facilities
For improving and expanding our range of products.

Now, with the P-K addition,
DURO-DYNE makes the most complete line of accessories
For the Sheet Metal, Air Conditioning, Heating and Ventilating Fields—
Punches, Damper Regulators, File and Solder Iron Handles—
Duro-Vane Rail for fabricating low cost, high quality air turning vanes,
Duro Metal-Fab *pre-assembled* flexible duct connector material,
Duro Blade Kit—precision engineered multi-blade damper hardware,
Greyhound Portable Spot Welder—as handy for the sheet metal worker as his snips!

We have literature and information on all these products.
Write us. We'd be happy to hear from you.

All products may be purchased through your local DURO-DYNE or P-K distributor.



Duro Metal-Fab

Duro Vane Rail

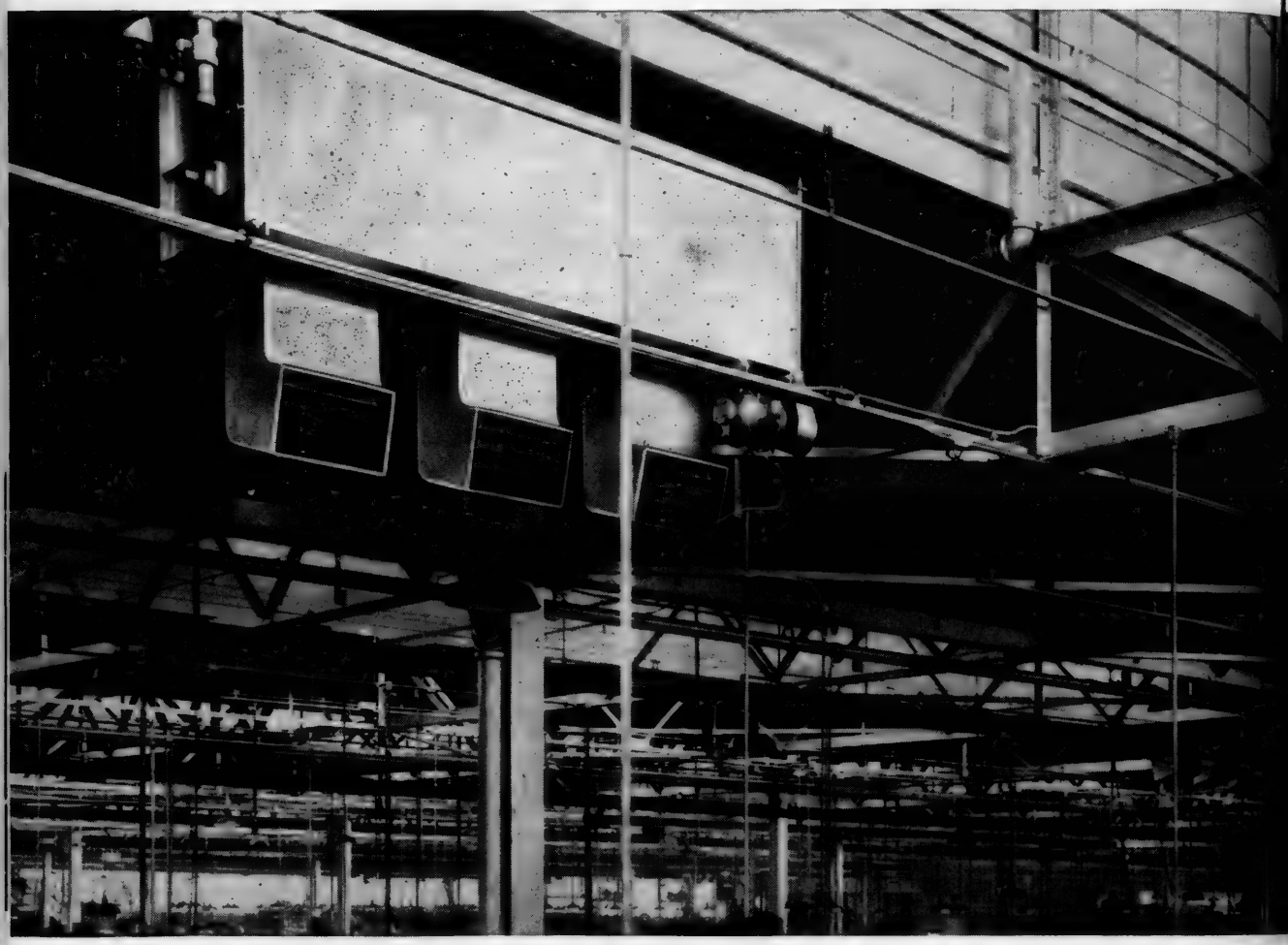
Duro Blade Kit

DURO-DYNE *Corporation*

800E Third Avenue, New Hyde Park, N. Y.

Here's why Trane Unit Heaters are in such demand:

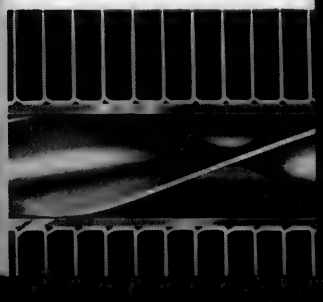
One unit can solve plant h
air cleaning or p



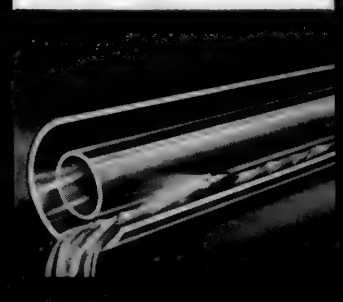
What the Torridor will do: The Torridor can be used to heat large areas where air must be spread over great distances, is equally suitable for heating numerous small rooms or a central system with ducts. It can be used as a combined heating and ventilating unit . . . for blanketing doorways with heat . . . for special process applications such as fog removal, ice melting, drying, curing, etc.

Typical users include: PRATT AND WHITNEY AIRCRAFT; WESTERN ELECTRIC CO.; CARBIDE AND CARBON CHEMICALS CO.; CATERPILLAR TRACTOR CO.; DEERE AND CO.; JOHNS-MANVILLE CORP.; KIMBERLY-CLARK CORP.; CORNING GLASS WORKS; INTERNATIONAL BUSINESS MACHINES CORP.

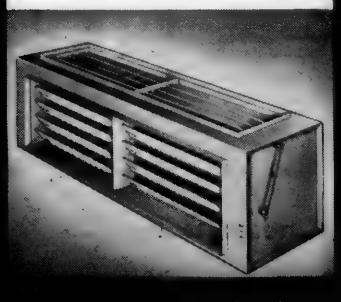
Turbulator in hot water coils assures maximum heat transfer from hot water to surface of coil tubes.

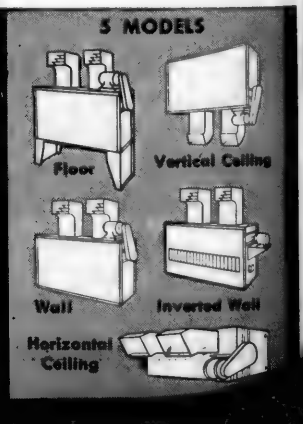


Kinetic orifice in steam coils releases steam in direction of condensate flow, speeds condensate drainage. Reduces possibility of freeze-up.



Mixing box blends re-circulated with outside air in any combination. Dampers may be operated manually or motorized. A standard accessory.





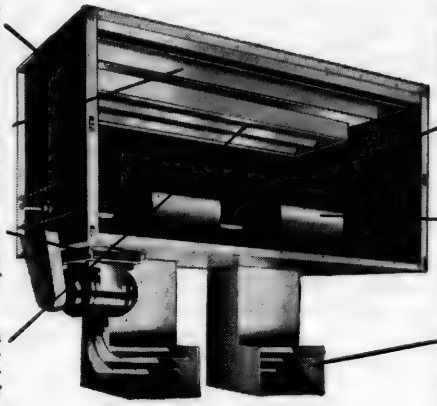
heating, ventilating, process-drying needs

Use this Trane Torridor with or without ducts...in large areas or small...for comfort or process heating and ventilating needs.

One unit does the work of many! A single TRANE Torridor unit can produce as much heat as several propeller-type heaters—plus ventilation. Pipe, valve and fitting needs are less . . . installation and maintenance costs are lower. Capacities up to 1½ *million* Btu's.

Locate Torridors anywhere! Units can be hung from walls or girders, mounted on ceilings, or set on the floor. A wide choice of nozzle arrangements, top or bottom discharge lets you direct warmth in any desired direction.

For hundreds of applications. Heating, ventilating, air cleaning, process heating or drying . . . the amazingly versatile, high-capacity TRANE Torridor solves many of these problems. For complete information contact your engineer or nearest TRANE Sales Office, or write TRANE, La Crosse, Wisconsin.



Rugged casing of bonderized steel. Extra strong, rigid, *welded* construction.

Coil choice of high or low pressure steam, hot water, standard or "non-freeze" SD type.

Hinged motor mounting block for quick, easy adjustment of belt tension.

Damper choice in ventilating models. Face-and-by-pass (shown) or Thermadjust.

Filter choice of permanent or throwaway types, in flat or V-type frames.

Removable panel provides easy access to heart of unit. (Shown removed.)

Quiet fans dynamically and statically balanced on electronic equipment.

Directional vanes in the nozzles straighten air stream, eliminate turbulence.

one source • one responsibility

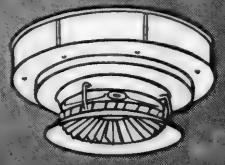
TRANE

Industrial Heating

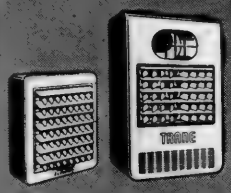
MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

The Trane Company, La Crosse, Wis. • Eastern Mfg. Div., Scranton, Pa. • Trane Co. of Canada, Ltd., Toronto • 90 U. S. and 15 Canadian Offices

Quality products for all your heating and ventilating needs

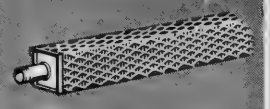


PROJECTION HEATER

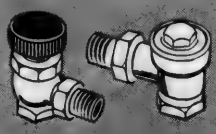


HORIZONTAL HEATERS
Model H—Gas-Fired

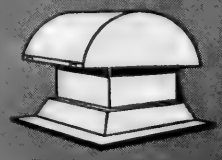
WALL FIN ELEMENT



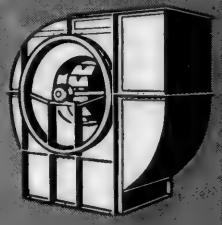
WALL FIN WITH GRILLE



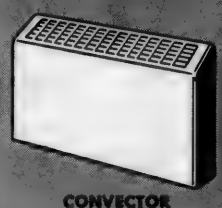
STEAM SPECIALTIES



ROOF VENTILATOR

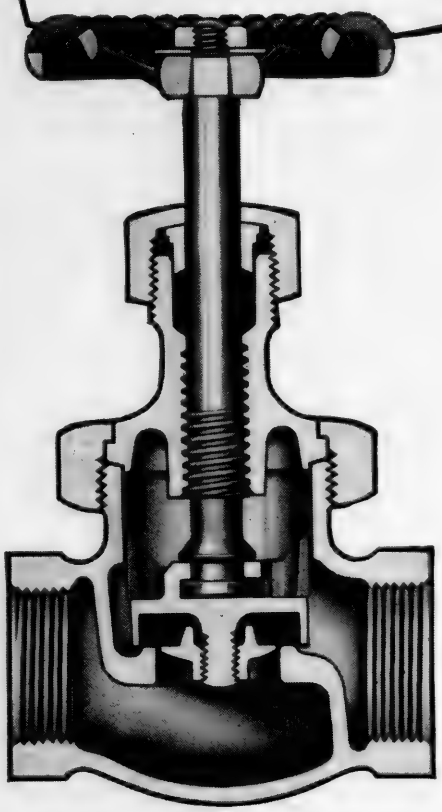


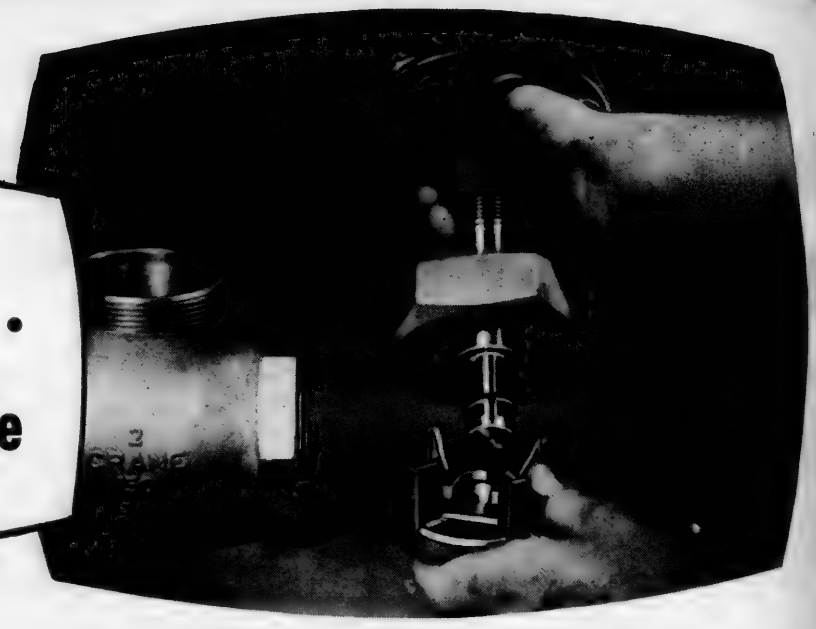
CENTRIFUGAL FAN



CONVECTOR

A New Disc . . .
A "New" Valve





Crane No. 7 Brass Valves with quick-change composition disc

Save time, trouble, and money by standardizing on these Crane quality 150-Pound Valves. Simple to service. No big inventory of replacement parts. Just a few extra disc holders . . . a supply of composition discs. That's all you need for a wide variety of fluids . . . and an economical maintenance program.

The composition disc takes most of the normal wear—stands up well under ordinary usage—seats easily even on air and gas—absorbs foreign particles that might cause leakage in metal disc valves. When a leak shows up, make a "new" valve—with a new disc. Simply dismantle the union ring, lift out the trimmings, replace the disc holder assembly. Takes only a few minutes. Save the disc holder you removed—use it with the next replacement disc.

Rugged construction throughout. Sturdy bonnet joint, well reinforced by heavy union ring—can be repeatedly dismantled and reassembled. Get better acquainted with the Crane No. 7 line . . . for steam, hot and cold water, air, oil, gas, gasoline, and many other fluids.

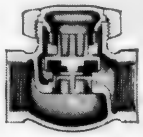
GLOBES, ANGLES, AND CHECKS

Ask for folder AD-1682R—contains full facts on the No. 7 brass valve line and the companion No. 27 check. Your Crane Representative has a copy for you—or write direct to address below.

No. 7 Globe
Sizes ⅛ to 3-inch

No. 7 Angle
Sizes ⅛ to 3-inch

Specify No. 9 for Flanged Ends



No. 27 Check
Sizes ¼ to 3-inch

THE BETTER QUALITY . . . BIGGER VALUE LINE . . . IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

READY NOW!

New YOUNG "Perimaheat"* Baseboard Convector

New YOUNG "Perimaheat" offers low cost . . . highly efficient hot water heating for every type of construction. It is the ultimate in modern heating design with many time and money saving features. Packaged in 6 and 8 ft. lengths, "Perimaheat" is light in weight, easy to handle, and easy to install.

Add new beauty, plus more usable wall space to your building projects with this *New* quality baseboard convector line. Use this convenient coupon to send for your free YOUNG "Perimaheat" Catalog, today!

*Trade Mark

YOUNG

RADIATOR COMPANY

RACINE, WISCONSIN

Plants at Racine, Wisconsin, and Mattoon, Illinois

Heating, Cooling, Air Conditioning Products for Home and Industry

Heat Transfer Products for Automotive, Agricultural, Industrial, Gas and Diesel Engine Applications

Leaders in Heat Transfer Engineering for more than 25 years.

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Young Radiator Company
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Please rush me your free new 12-page "Perimaheat" Catalog today . . . without obligation. I want to learn more about new Young "Perimaheat" baseboard heating.

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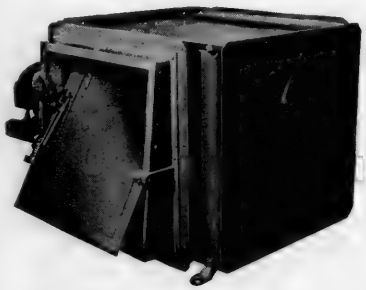
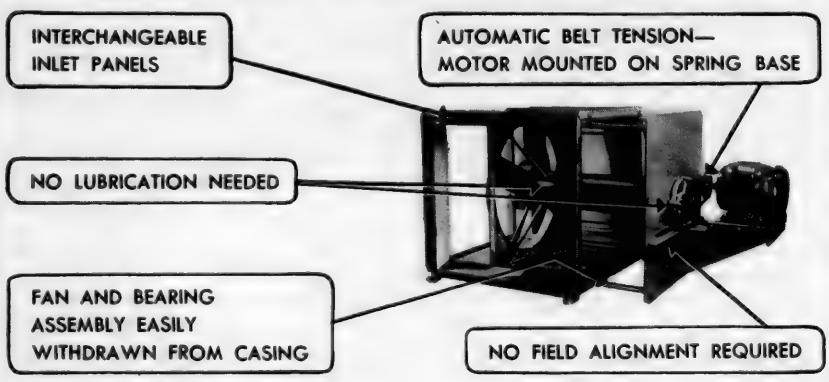
"Sales and Engineering Representatives in All Principal Cities"

NEW WING DRAFT INDUCER



ADVANCED DESIGN SETS NEW HIGH STANDARD

EASIER INSTALLATION • MORE ADAPTABLE • INSURE LONG, TROUBLE-FREE OPERATION

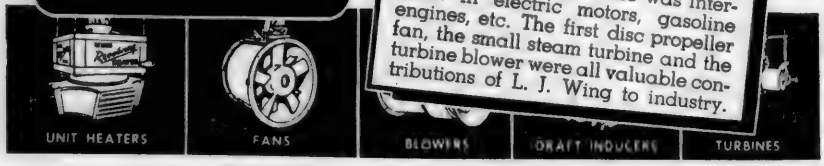

INTERCHANGEABLE INLET PANELS
AUTOMATIC BELT TENSION— MOTOR MOUNTED ON SPRING BASE
NO LUBRICATION NEEDED
FAN AND BEARING ASSEMBLY EASILY WITHDRAWN FROM CASING
NO FIELD ALIGNMENT REQUIRED

Wing Draft Inducers furnish positive uniform draft regardless of wind or weather conditions. They eliminate the need for tall, costly chimneys. Smoke and soot are reduced and boiler efficiency is improved. Higher CO_2's and better fuel consumption result. Write for Bulletin I-52.

L. J. Wing Mfg. Co.
158 Vreeland Mills Road
Linden, N.J.
Factories at Linden, N.J. and Montreal, Canada

OUR 75TH YEAR 1879

Wing

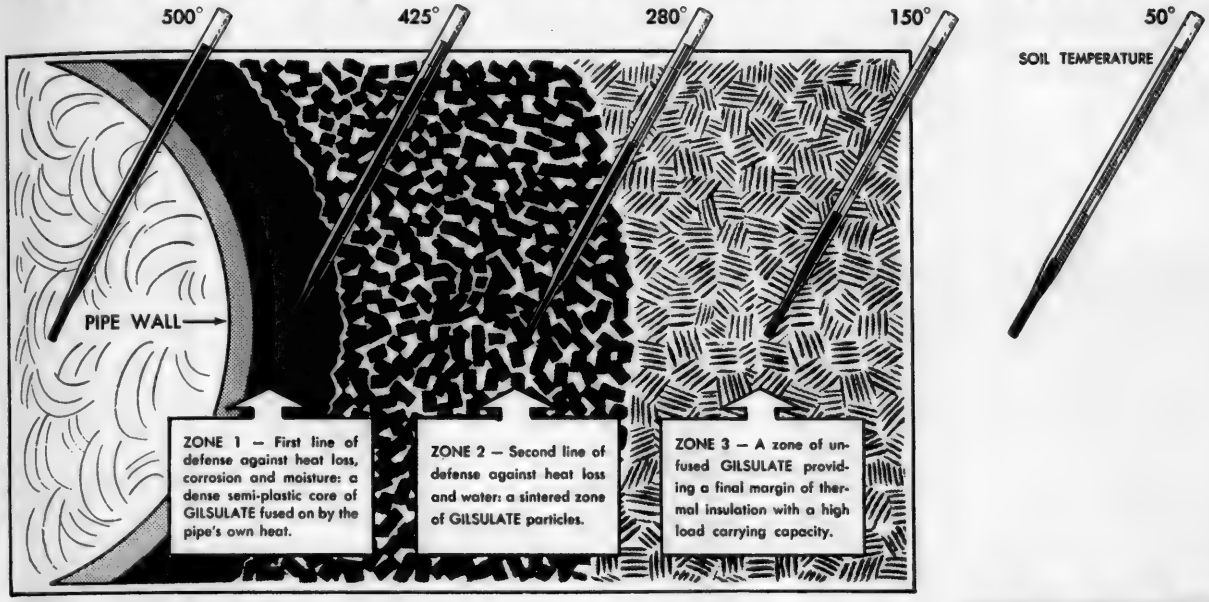


SEVENTY-FIVE YEARS AGO

The high wheel bicycle was all the rage in 1879, the year L. J. Wing founded the company that now bears his name. Mr. Wing's prolific talents in mechanical invention were largely in the fields of ventilation and combustion, although he also was interested in electric motors, gasoline engines, etc. The first disc propeller fan, the small steam turbine and the turbine blower were all valuable contributions of L. J. Wing to industry.

Lowest Cost

PER INSTALLED LINEAR FOOT OF ANY HOT UNDERGROUND PIPE INSULATION


500°
425°
280°
150°
50°
SOIL TEMPERATURE
PIPE WALL
ZONE 1 — First line of defense against heat loss, corrosion and moisture: a dense semi-plastic core of GILSULATE fused on by the pipe's own heat.
ZONE 2 — Second line of defense against heat loss and water: a sintered zone of GILSULATE particles.
ZONE 3 — A zone of unfused GILSULATE providing a final margin of thermal insulation with a high load carrying capacity.

GILSULATE®... the triple-zone insulation that fuses itself into lifetime protection for hot underground pipes. Water-proof, corrosion-proof, root-proof, acid/alkali-proof.

Compare your present insulation methods with Gilsulation:

1. Pour Gilsulate granules out of the bag onto the pipe; tamp it down.
2. Backfill: *the job is insulated!*

Gilsulate—nature's own insulation—is a unique, solidified hydrocarbon that virtually installs itself. Normal pipe-heat (up to 520°F) does the rest—fuses the Gilsulate to the pipe in hours, forming a massive circular solidified sheath.

Gilsulate costs less installed per linear foot *than any other underground pipe insulation*... it's easiest to use... and has been tested in scores of the country's largest and most important installations.

Some additional Gilsulate advantages:

- *3 grades available*—220° to 520° F
- *needs no sleeves* or mechanical sheaths
- *requires no mixing* or special handling
- *can't be punctured* — leave rocks in backfill
- *pipe expands and contracts* within Gilsulate structure
- *proved in actual use* in hundreds of new construction and replacement installations

Send coupon for descriptive literature.

AMERICAN GILSONITE COMPANY
SALT LAKE CITY, UTAH
Affiliate of Barber Oil Corp. & Standard Oil Co. of California

No skills necessary—simply pour Gilsulate out of 100 pound bags, tamp and backfill. Can be used under any and all conditions—no matter how many pipes, whatever the space.

GILSULATE®

THE TRIPLE-ZONE INSULATION
FOR LIFETIME PROTECTION
OF HOT UNDERGROUND PIPES.

American Gilsonite Company
134 West Broadway, Salt Lake City 1, Utah
or 1145 East Jersey Street, Elizabeth 4, N. J.

Please send me descriptive literature on Gilsulate.

NAME.....

TITLE.....

COMPANY.....

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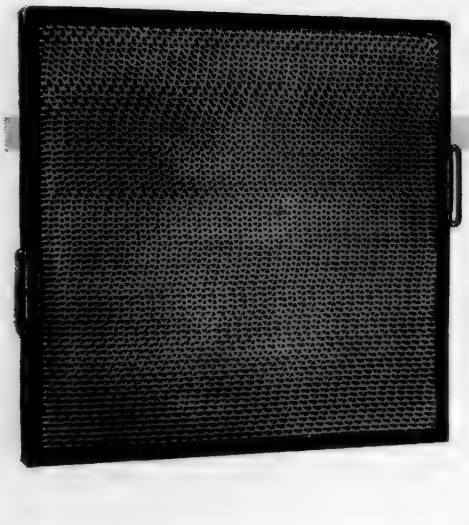
HV

You're really looking at 9 air filters!



Because one filter won't do *every* air cleaning job, Farr Company has nine standard types designed to handle practically any dirt condition. Each embodies the famous herringbone-crimp media design and other Far-Air quality features, but differs in materials, thickness, etc. When you select the type you need from the Far-Air line, you are assured of getting the most practical solution for your particular dust problem. Remember, the operating efficiency of the entire air handling system is dependent on the filters used. That is why it is important that the *right type* filters be installed. Farr field engineers will be happy to study your air cleaning problems and make specific recommendations.

Type 68—2"—finer mesh media and tighter pack for higher efficiency on small particles.

Type 44-68—4"—double packed for special applications requiring the highest efficiency.

Type 44—1"—gable crimped for high efficiency; for ventilation, package air conditioners, furnaces, etc.

Type 44—2"—general ventilation for dirt, lint, paint, grease, oil, etc.

Type 44—4"—for greater dirt capacity.

Type MZ—2"—zinc chromate painted before and after assembly; hot dipped galvanized frame; marine ventilation application.

Type MZ—4"—same except 4" thick.

Except as noted, filters are made of zinc electroplated herringbone-crimp steel screen media in sturdy steel frames. Other materials are aluminum, stainless steel and monel. Available in all sizes.

Type C4C4—2"—all copper media and frame; for corrosion resistant water eliminators, etc.

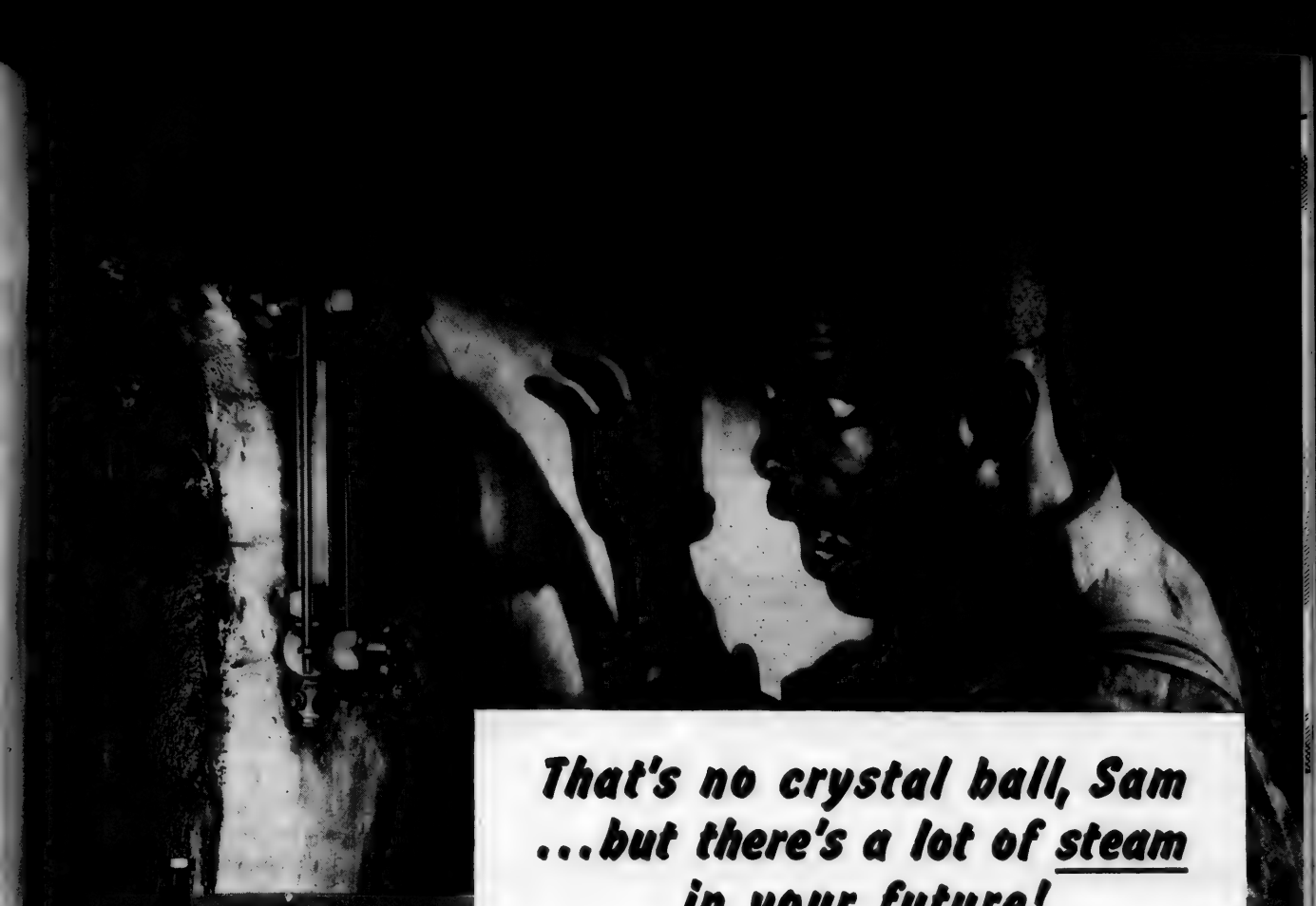
Type C4C4—4"—same except 4" thick.

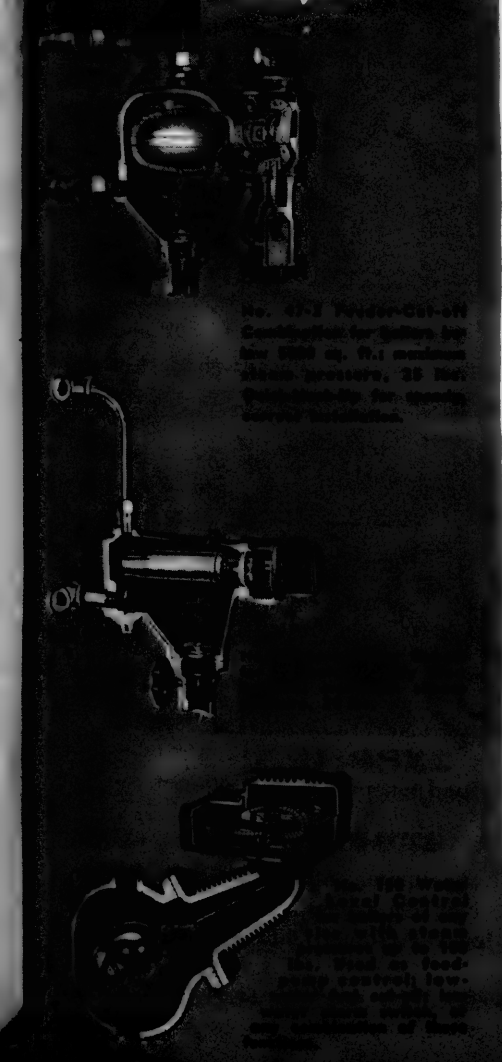
Send for complete catalog of FAR-AIR products to Farr Company, P.O. Box 45187, Airport Station, Los Angeles 45, California

FARR COMPANY

NO COMPROMISE ON QUALITY

Los Angeles, New York, Chicago, Memphis





That's no crystal ball, Sam ...but there's a lot of steam in your future!

If anybody has the idea that steam is on the downgrade — he'd better have another look. As it stands now, things are looking up in the steam business — and just getting off to a good start!

For instance, take the new Iron Fireman SelecTemp system, which uses low pressure steam to supply heat and to operate turbine-driven circulating fans upon individual room thermostat demand. Then, too, there's the growing recognition of the importance of steam in hot water heating systems. Like the setup that utilizes steam to water heat-exchangers at various building levels in high commercial structures. And the system that specifies installation of the steam boiler at the *high* point of a building, so that hot water drawn from below the boiler water level is circulated through the heating system and back to the boiler. Both good examples of hot water heating via the steam route!

That's how things go these days — *always* something new in steam heat. And as long as there are developments in boilers and heating systems, there'll be dependable McDonnell water level controls for any type or sizes . . . just as there are now. That's why the Sam-you-better-scram idea has a big future — and it's looking better all the time.

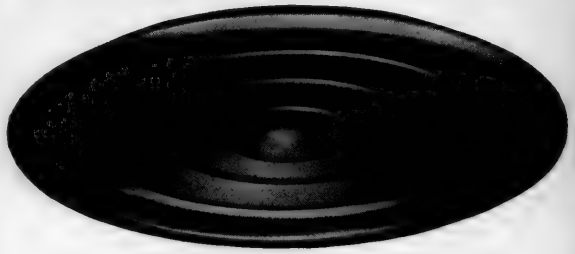
McDONNELL & MILLER, Inc.
3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One Thing Well

McDONNELL

Aerofuse

In appearance, Aerofuse Diffusers are styled to harmonize with contemporary architectural concepts . . . in performance, the flexibility of the line permits engineers to select a type and size that will operate with top efficiency . . . simplicity of design and rugged construction result in simplified installation. Good reasons why Aerofuse Diffusers have nation-wide acceptance by architects, engineers, contractors and owners, and are installed in the most modern multi-story office buildings and department stores, in commercial and recreational buildings, institutions and industrial plants . . . wherever people work or relax in air conditioned comfort.

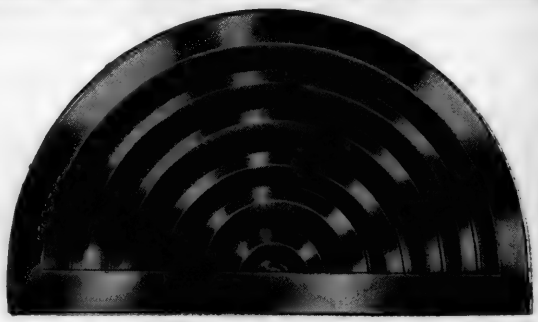


TYPE PA
Adjustable pattern diffuser

TYPE PR
Flush type, fixed pattern supply and return diffuser

TYPE PLF
Flush type, fixed pattern diffuser combined with light fixture

TYPE S
Flush type, fixed pattern diffuser

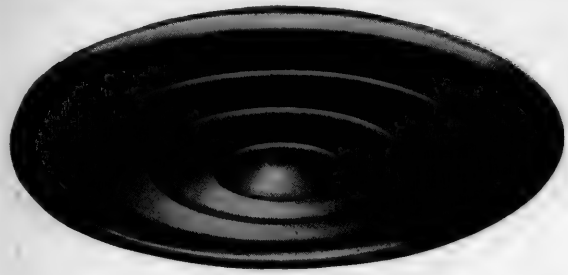


TYPE H
Flush type, fixed pattern half-round diffuser

Accessory Equipment

To meet specific air delivery requirements, volume control dampers, distributing grids, blanking baffles, and other accessory equipment is available for all Aerofuse Diffusers.

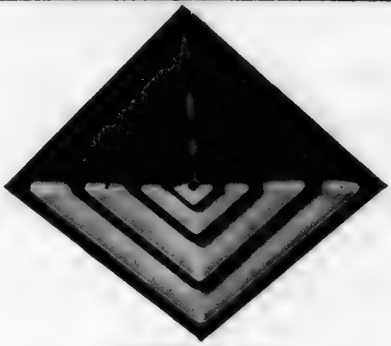
A wide selection of diffuser types and sizes, styled and engineered to meet the most rigid requirements of appearance and performance at the point of air delivery



TYPE PS
Stepped-down type, fixed pattern diffuser

TYPE PF
Flush type, fixed pattern diffuser

TYPE PH
Flush type, fixed pattern, half round diffuser



TYPE D
Flush type, fixed pattern square diffuser

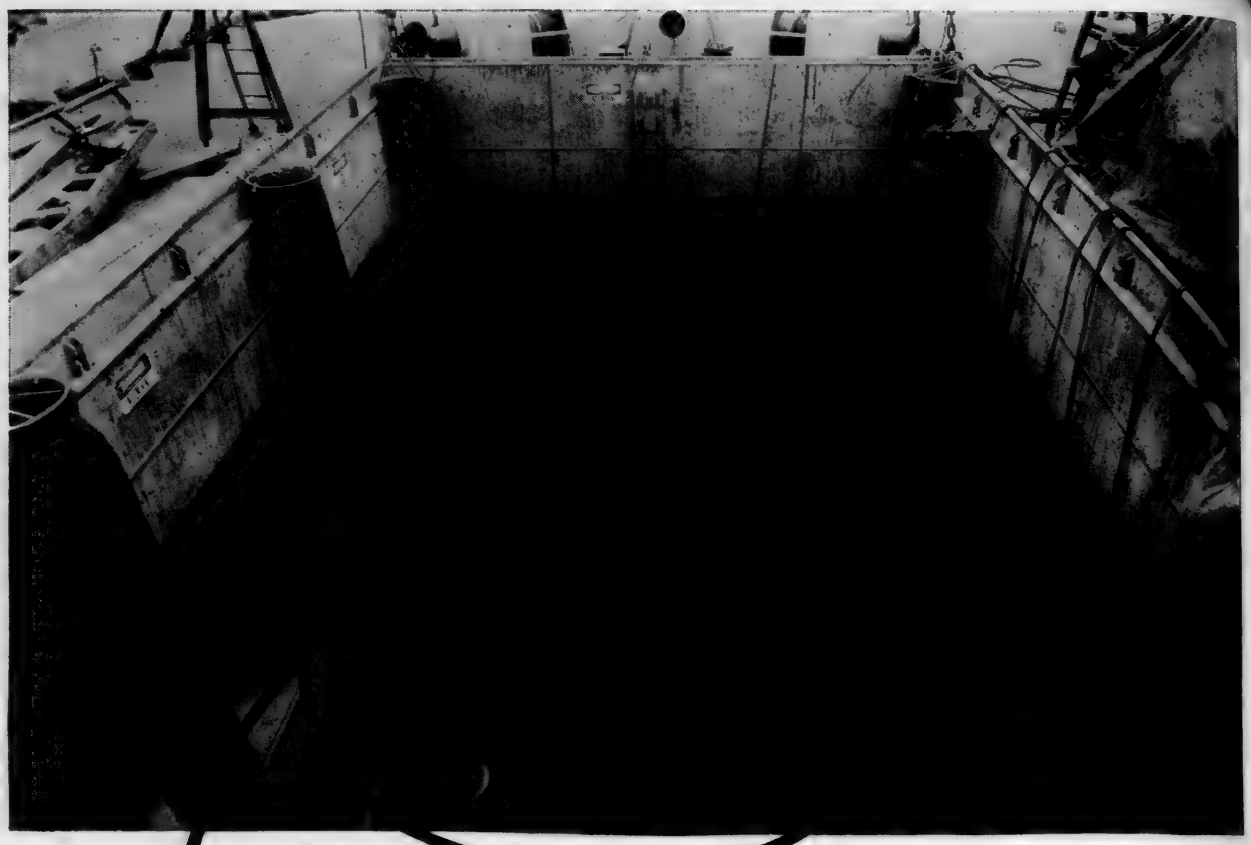
TYPE ES
Stepped-down type, fixed pattern diffuser

TUTTLE & BAILEY inc

NEW BRITAIN, CONNECTICUT

NEW . . . Aerofuse Catalog No. 108.

Complete information on the Aerofuse line of ceiling diffusers and accessory equipment, engineering data, size selection charts and directions for installation. Send for your copy today.



Ventilation for Spray Painting

. . . A JOB FOR JOY AXIVANE® FANS

Unexcelled performance in tight quarters, plus rugged compactness and fast, easy installation and relocation of the units when necessary . . . those were the main reasons why Joy Series 1000 Axivane Fans were selected for the vital job illustrated above. They're exhausting toxic, explosive fumes from spray-painting operations in enclosed areas below-decks in a large ship. Canvas ducts carry the fumes to open air on an upper deck.

Another shipboard job: a deck-mounted Series 1000 Fan provides air circulation in ballast tanks—5000 cfm at 3" pressure.

Applications like these effectively demonstrate the inherent advantages of Joy fans. Their vaneaxial design is highly efficient, yielding a maximum air volume-to-power ratio. Blades are of true airfoil shape, and are readily adjustable for maximum flexibility to meet varying conditions. Thick steel casings are used in the sturdy construction that smothers operating noise.

Series 1000 fans are available in 136 models, from 18" to 84" in diameter. Duties range from 600 to 200,000 cfm, and from .125" to 11" total pressure. They're easily installed right in the duct in horizontal, vertical or inclined positions with direct drive, and available also with V-belt drive. ● Let's talk over *your* fan problem—or write for Bulletin J-611. **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

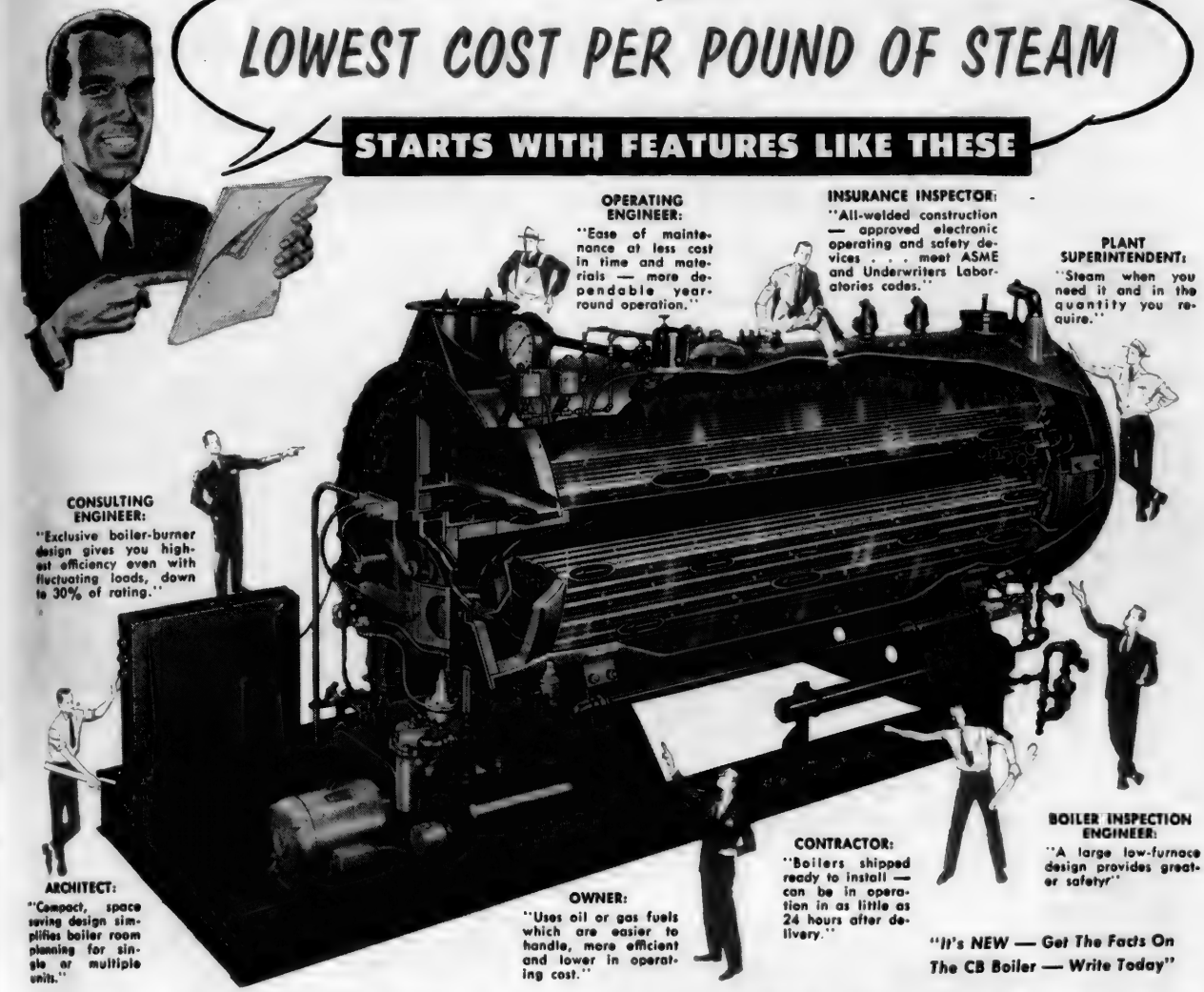
JOY

WAD 13301

WORLD'S LARGEST MANUFACTURER OF VANEAXIAL-TYPE FANS

LOWEST COST PER POUND OF STEAM

STARTS WITH FEATURES LIKE THESE


OPERATING ENGINEER:
"Ease of maintenance at less cost in time and materials — more dependable year-round operation."
INSURANCE INSPECTOR:
"All-welded construction — approved electronic operating and safety devices . . . meet ASME and Underwriters Laboratories codes."
PLANT SUPERINTENDENT:
"Steam when you need it and in the quantity you require."
CONSULTING ENGINEER:
"Exclusive boiler-burner design gives you highest efficiency even with fluctuating loads, down to 30% of rating."
ARCHITECT:
"Compact, space saving design simplifies boiler room planning for single or multiple units."
OWNER:
"Uses oil or gas fuels which are easier to handle, more efficient and lower in operating cost."
CONTRACTOR:
"Boilers shipped ready to install — can be in operation in as little as 24 hours after delivery."
BOILER INSPECTION ENGINEER:
"A large low-furnace design provides greater safety."

"It's NEW — Get The Facts On The CB Boiler — Write Today"

that's why you profit most from Cleaver-Brooks self-contained boilers

• Top to bottom, inside and out, you get more money-saving features when you specify or buy Cleaver-Brooks self-contained boilers. You make an *investment in quality* that pays off in lowest net cost per pound of steam for processing or heating.

YOU BENEFIT from more than 20 years of experience, working closely with men who have made it their business to be *right* about boilers. You profit from complete coordination throughout planning, installing, supervising and final operation.

YOU BENEFIT from self-contained design and original four-pass construction. These Cleaver-Brooks engineered "firsts," plus forced draft, 5 sq. ft. of heating surface per boiler hp, and exclusive burners, all contribute to highest heat transfer. Guaranteed 80% thermal efficiency when firing with oil is the direct result!

Whether you're planning a new steam plant or modernizing, make certain you get the complete Cleaver-Brooks story before you buy. See your Cleaver-Brooks representative or write for catalog AD-100. Cleaver-Brooks Company, Dept. L-314, 326 East Keefe Avenue, Milwaukee 12, Wisconsin, U.S.A. *Cable Address CLEBRO — Milwaukee — All Codes.*

One typical owner can count on yearly savings ($15,000 fuel and $10,000 labor) from this battery of three 150 hp Cleaver-Brooks self-contained boilers.

•

NOW — FIRST SIZES OF THE CB BOILER ARE MADE IN CANADA, TOO.

•

Cleaver Brooks

ORIGINATORS OF THE SELF-CONTAINED BOILER

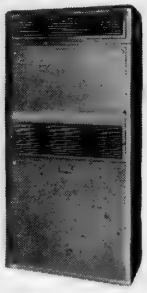
BOILERS . . . STEAM OR HOT WATER . . . FOR HEATING OR PROCESSING, IN SIZES FROM 15 TO 500 hp, 15 to 250 PSI.

Curtis Air Conditioning and Refrigeration

Offers You MORE OPPORTUNITIES

For Sales and Profit

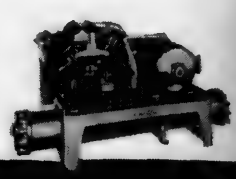
Efficient Room Air Conditioners

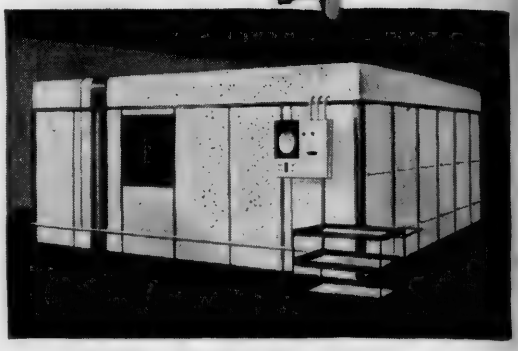


2, 3, 5, 7½, and 10-ton Packaged Units

COOL JUST A ROOM OR TWO . . .

Condensing Units— 15 through 80 tons

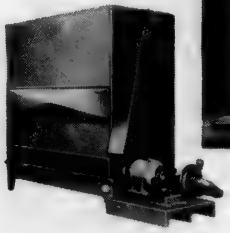




CONTROLLED COOLING FOR PROCESSING . . .

OR COOL AN ENTIRE BUILDING

Residential Combination Heating-Cooling Units

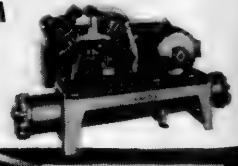


Evaporative Condensers and Cooling Towers

To see if you qualify for a direct factory franchise, write us on your company letterhead.

OR REFRIGERATE AN ENTIRE STORAGE ROOM

Condensing Units— 15 through 80 tons



Go All the Way with Curtis

the company that gives you everything you need to do practically any refrigerating or air conditioning job. Curtis *quality* is your assurance that those jobs will be Right—that customers will be completely satisfied.
And with Curtis, you never work *alone*. National advertising in *Saturday Evening Post, Time, Newsweek* and other important publications helps sell Curtis to prospects near you.

1854 100 years 1954

OF SUCCESSFUL MANUFACTURING EXPERIENCE

Curtis REFRIGERATING MACHINE DIVISION

of Curtis Manufacturing Company

1999 Kienlen Avenue • St. Louis 20, Missouri

901

NEW!

TUBE-TURN Full-Encirclement Saddle improves "hot-tapping" of piping

SAFER, STRONGER "hot taps" are now made possible by the TUBE-TURN Full-Encirclement Saddle shown above. This new product is the first of a group of important developments of Tube Turns' unique pulsation pressure testing program.

Split longitudinally on a horizontal plane, perpendicular to the axis of the outlet, this new "hot tapping" reinforcement eliminates welds in the critical crotch area. Its installation requires a minimum amount of field welding. When used with high yield strength pipe, no welds are required between saddle and line pipe.

The TUBE-TURN Full-Encirclement Saddle is designed for high yield strength thin-wall pipe and for heavy wall cylinders used for headers, bottles and pulsation dampeners. It can be supplied for pipe sizes through 42", any outlet size, in composition and wall thickness to match service conditions.

The Leading Manufacturer of Welding Fittings and Flanges

TUBE TURNS LOUISVILLE 1, KENTUCKY

A Division of National Cylinder Gas Company

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Cleveland • Chicago • Denver • Los Angeles
San Francisco • Seattle • Atlanta • Tulsa • Houston • Dallas • Midland, Texas

"tt" and "TUBE-TURN" Reg. U.S. Pat. Off.

How to install the new TUBE-TURN Full-Encirclement Saddle for a "Hot Tap"

1. *Weld branch outlet pipe to run pipe according to normal procedure.*
2. *Position and block up bottom half of full-encirclement saddle.*

3. *Slip top half of full-encirclement saddle over branch outlet. Bring two halves together tightly by means of clamp such as shown.*

4. *Tack weld longitudinal lap plates to top half of saddle, remove clamp and complete welding of plates. (Plates are shop-welded to bottom half).*

5. *Fillet weld saddle outlet to branch pipe.* 6. *Join branch pipe to* TUBE-TURN *Welding Neck Flange. Normal tapping procedure follows.*

NOTE THAT when used with high yield strength, thin-wall pipe, as shown above, circumferential welds between saddle ends and run pipe are not required. This precludes possibility of failure due to underbead cracking or to local stress concentrations which exists at such attachment welds with conventional saddles or other types of "hot tap" fittings which must be fillet welded to high yield strength, thin-wall pipe. The TUBE-TURN Full-Encirclement Saddle fully meets all requirements for reinforcement of welded branch connections as developed by Section 8 of the Code for Pressure Piping.

This new, advanced design is another example of TUBE TURNS' pioneering... why it pays to do business with the leader.

TUBE TURNS LOUISVILLE 1, KENTUCKY

A Division of National Cylinder Gas Company

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Cleveland • Chicago • Denver • Los Angeles
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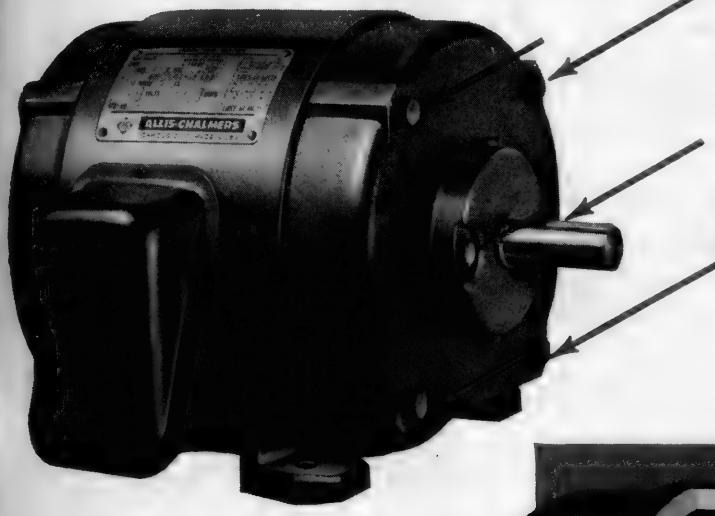
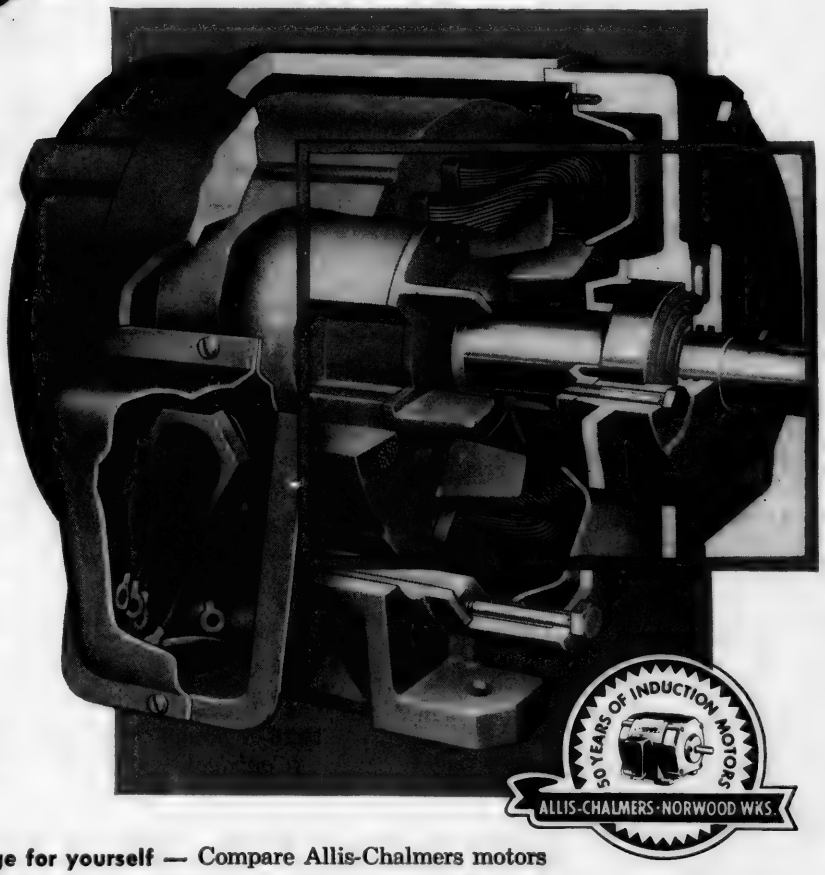
TUBE-TURN

Here's motor superiority

you can see



It takes 6 bolts not just 4 to give full bearing protection



THE TWO EXTRA BOLTS in the end housing of every Allis-Chalmers ball bearing motor are the proof of *extra* protection against bearing failure. These are the bolts that hold the bearing cap tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure . . . protects the grease and the bearing against contamination from dirt and moisture.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

Result? Allis-Chalmers motors pay off in longer, trouble-free bearing life, lower motor maintenance.

Get all the facts . . . judge for yourself — Compare Allis-Chalmers motors with other motors. Get the six-bolt construction that gives you complete bearing protection. For proof, see your Allis-Chalmers Office or Authorized Distributor, or write — Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-C ALLIS CHALMERS

A-4440

Tempus Fugit! 40 YEARS

Remember?

1914 *First ship thru Panama Canal*
1915 *Belgian Relief under Herbert Hoover*
1916 *Pershing went after Pancho Villa*
1917 *"Over There"*
1918 *First domestic refrigerator designed by E. J. Copeland and sold by Kelvinator. G. M. Frigidaire Division started*
1919 *Dempsey ko's Willard*
1920 *Prohibition begins*
1921 *Willis Carrier invents first centrifugal refrigerating machine*
1922 *Il Duce rules Italy*
1923 *Mah Jong*
1924 *King Tut's tomb*
1925 *Florida boom*
1926 *Queen Marie visits U.S.*
1927 *Babe Ruth hits 60 homers*
1928 *"I do not choose to run." (Coolidge)*
1929 *Stock Market Crash*
1930 *Freon-12 developed by Dr. Thomas Midgeley and Dr. Albert E. Henne*
1931 *Sidewalk apple vendors*
1932 *Lindbergh kidnapping*
1933 *Chicago's World's Fair. Hitler rules Germany*
1934 *Dionne Quintuplets born*
1935 *FDR's Fireside Chats*
1936 *"Sitdown" strikes . . . King Edward abdicates*

Valves, Driers, Strainers, Control Devices and Accessories
Refrigeration and Air Conditioning and Industrial Applicatio

The First Henry product went into service just 40 years ago

hat was 1914 . . . the year that "Miracle Man" eorge Stallings led the Boston Braves from last ace on July 4 to victory in the World Series . . . e year that Kaiser Wilhelm launched World War In 1914 Henry Ford astounded the world with s five-dollars-a-day minimum wage, and two hun- ed natural ice manufacturers convened in New ork City.

The development of modern Refrigeration, Air onditioning and Low Temperature Freezing rough the years since 1914 has been one of Amer- n Industry's truly great achievements. To men ke Carrier, Copeland, Birdseye, Midgeley, Henne, nd a host of other scientists and inventors all man- ind is forever indebted. It is a privilege to have d a part in the growth of the giant industries hich the genius of these scientists made possible; d to have been associated with the engineers, the ecutives and the salesmen who labored to bring e fruits of genius into the lives of men.

The most gratifying reward forty years have brought to us at Henry Valve is the friendship of so many people at the top and in the ranks of the Refrigeration, Air Conditioning and Low Temperature Freezing Industries.

The basis of these friendships is confidence in the products and the policies of this organization. Operating men know from long experience that Henry Valves, Driers, Strainers and Specialized Control Devices perform their functions dependably and well. Manufacturers have found that Henry advanced design and quality construction improve the sales value and the performance of their products. Contractors and service men know that Henry Products work *with* them to satisfy the customer. All of these, and wholesalers as well, know that fairness and the sincere desire to give more value per dollar are basic with Henry in all dealings.

That's the way it has been for forty years. That's the way it will be in the years ahead.

937 *The "Recession"*
938 *"Wrong Way" Corrigan*
939 *World War II begins*
940 *FDR vs Willkie*
941 *Pearl Harbor*
942 *Guadalcanal*
943 *Ration Books*
944 *Normandy Landing*
945 *V-E and V-J Days*
946 *First radar contact with moon*

1947 *Princess Elizabeth marries the Duke*
1948 *Truman and Citation strong in the stretch*
1949 *Russia explodes atomic bomb*
1950 *Reds invade Korea*
1951 *Truce talks*
1952 *"I like Ike"*
1953 *End of Korean War*
1954 Henry Valve's 40th Anniversary

GUY J. HENRY
Founder and President

ONTROLLING FLOW INCE 1914

HENRY VALVE COMPANY

Melrose Park, Ill. (Chicago Suburb) • Cable: HEVALCO, Melrose Park, Illinois

MARLEY DOUBLE-FLOW AQUATOWERS*

DOUBLE-FLOW AQUATOWERS DON'T TOWER! Their size-performance ratio is revolutionary. A single-cell model that efficiently cools 1,800 gpm is just eight feet high. That's why engineers and architects have made them the No. 1 selection for finest modern buildings and most extensive modernization projects.

These towers lend themselves to economical screening by masonry or wood structure and, in many cases, are completely concealed by normal parapet walls. Double-Flow Aquatowers are small in physical dimension only, for they pack highly concentrated cooling ability in every foot of plan area. They are "big tower" in every respect with open gravity distribution, double utilization of fan horsepower, close-packed, high-efficiency filling and the rugged simplicity offered only by Marley design.

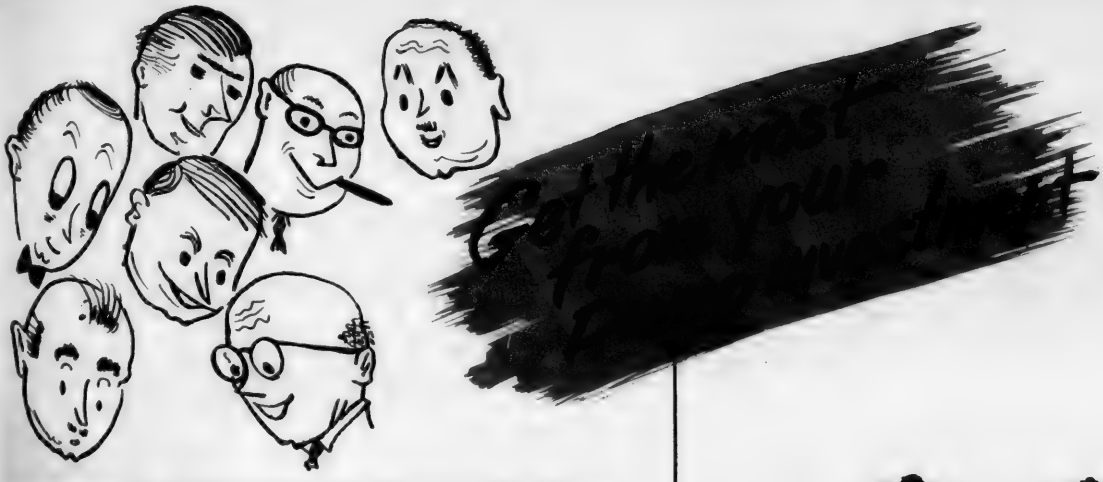
Double-Flow Aquatowers are available in Models 8 and 12 in single and multi-cell units . . . they fit every application in the intermediate capacity field. Write today for Bulletin DFA or call your Marley representative in any of 55 cities for complete information on the "hottest thing in water cooling!"

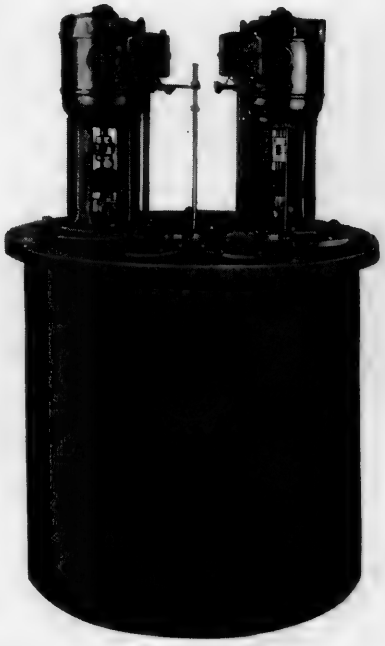
MARLEY

Double-Flow design fully protected by U. S. Pat. Re21794

The Marley Company Kansas City, Missouri

*Trademark Reg.

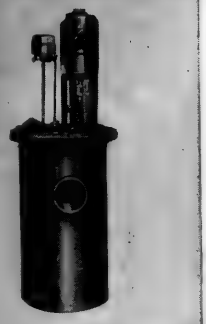




Alert-minded . . . engineers and contractors who are value and maintenance-wise are "all eyes" on Skidmore Pumps. Men *who know* are quick to spot the many advantages that only dependable Skidmore Pumps can offer — whatever your heating pump installation requirement — look at Skidmore *first!*

TYPE "UV" — Available in duplex and single units — recommended for below floor level returns. Unit is bolted to sump type receiver. Capacities ranging from 2,000 to 40,000 sq. ft. E.D.R. and discharge pressures from 10 to 75 pounds.

Skidmore Pumps have set a Standard of performance and dependability since 1921



There's a wide range of types and capacities for every heating pump need. Let Skidmore advise you on your next tough job.

TYPE UV

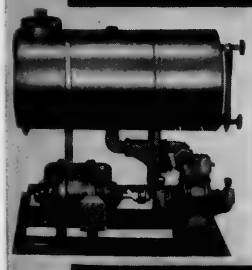
Type UV Condensation Pump is designed for below floor level returns, and is built in single and duplex units.

Write for *Bulletin No. 19-A*

TYPE HS

Type HS Pump is recognized for its dependable low operating cost. Capacities range from 1,000 to 65,000 sq. ft. EDR and pressures from 10 to 75 pounds.

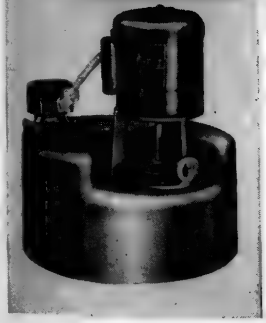
Write for *Bulletin No. 14-A*



TYPE TM

Type TM High Pressure Turbine Pump. Designed for pressures up to 150 pounds and boilers to 250 H.P.

Write for *Bulletin No. 17*



TYPE CV

Type CV Vertical Pump is ideal where space is limited. This model like every Skidmore Pump is built to meet specific requirements. For the correct solution to your own pump problem consult a Skidmore Heating Pump Specialist.

Write for *Bulletin No. 21*

SKIDMORE PUMPS

SKIDMORE CORPORATION
ST. JOSEPH, MICHIGAN

HERE'S YOUR *Complete* STEAM PLANT

- One purchase, backed by undivided responsibility.
- Shipped completely assembled after factory tests to assure highest operating efficiency.
- More than 80% thermal efficiency guaranteed.
- 4-pass design provides 5 sq. ft. of heating surface per b.h.p.
- Induced draft fans which are built-in eliminate the need of an expensive chimney.
- Simple installation requires no special foundation.
- Clean, quiet operation.
- Heavy-duty, rugged construction assures long-lived dependability.
- Burner equipment to suit your fuel: gas, oil or both.
- 18 sizes from 20 to 600 b.h.p. for pressures up to 250 p.s.i., or for hot water heating.
- For complete details, write today for catalog 619.

SUPERIOR STEAM GENERATORS

SUPERIOR COMBUSTION INDUSTRIES, Inc.

Factory: Emmaus, Pa.

Executive Offices: Times Building, Times Square, New York 18, N. Y.

REQUIREMENTS

r cleanouts are
ldom more than

INIMUM
REQUIREMENTS

, leaving clients
lnerable to repeated
nnecessary expense

Day-to-day cost of maintaining buildings can become a very large item if gaining access to drainage-line stoppages requires destruction of fittings, walls or floors. Lack of sufficient accesses and use of clean-outs which merely meet code requirements are the causes of such needless expense. As anyone who has ever tried to remove one knows, ordinary "cleanout plugs" freeze immovably in a matter of months. SUPREMO PERFECT SEAL CLEANOUTS will *always* provide quick, sure access and positive re-sealing, whether the installation is two months or twenty years old.

Code requirements can be hazardous in the matter of *cleanout location*, as well. Every building drainage plan presents a new set of potential "trouble zones". Provide SUPREMO PERFECT SEAL CLEANOUT access not only at the usual 50-foot intervals, but at every foreseeable trouble zone. It is a client obligation, which, if observed, will pay dividends for years to come.

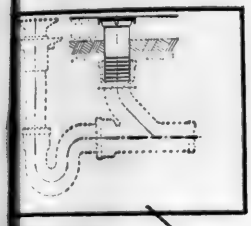
J.A. ZURN MFG. CO.
ERIE, PA., U.S.A.

Sales Offices in Principal Cities of the World

AFFILIATE: AMERICAN FLEXIBLE COUPLING COMPANY
IN CANADA: CANADIAN ZURN ENGINEERING LTD., MONTREAL, P. Q.

ZURN
SUPREMO
CLEANOUTS and ACCESS COVERS

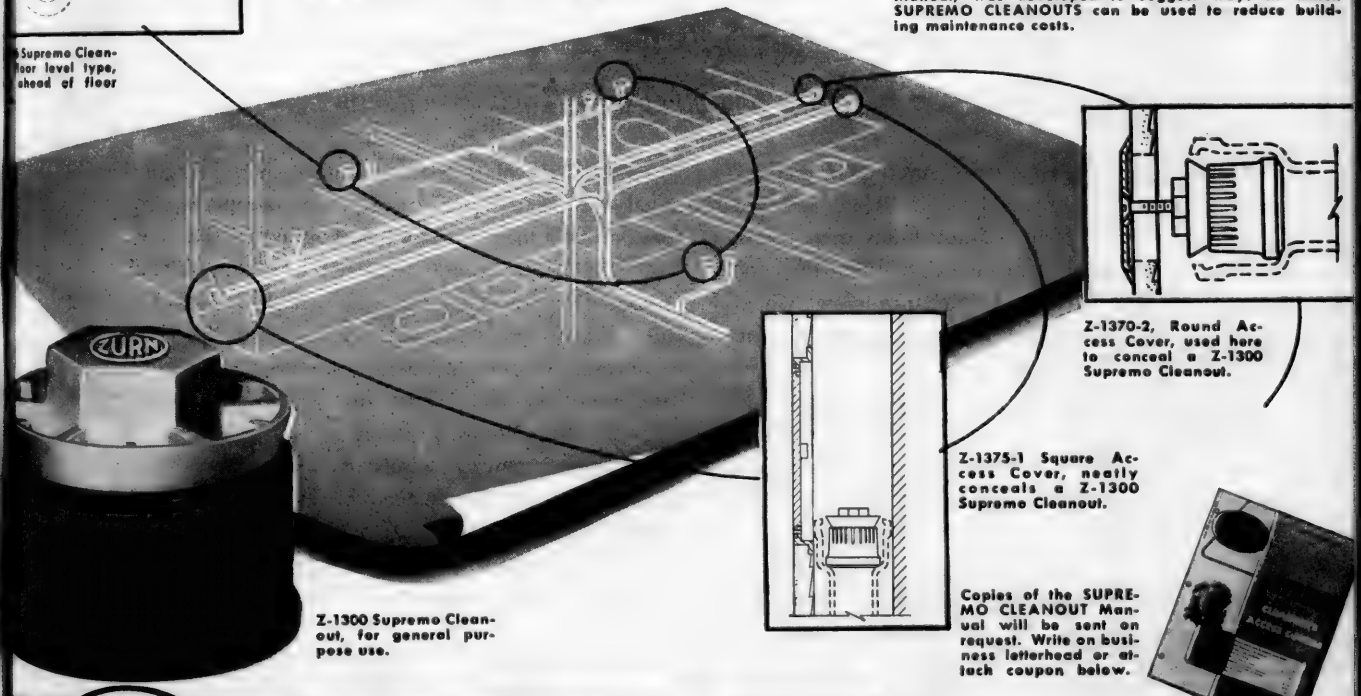
.... EXCEED CODE REQUIREMENTS—PROVIDE SURE, QUICK NON-DESTRUCTIVE ACCESS TO DRAINAGE LINES WHENEVER IT IS NEEDED!



Isometric drawing of typical rest room drainage lines. Supremo Cleanouts installed ahead of changes in direction of flow and at upper terminals of horizontal lines assure low cost of maintenance for the life of the building.

WHERE SHOULD CLEANOUT ACCESS BE LOCATED? Below, in isometric view, is a drainage plan for a typical rest room, conceived to illustrate the use of various SUPREMO PERFECT SEAL CLEANOUTS. This plan, one of several presented in the new SUPREMO CLEANOUT Manual, was developed to suggest ways in which SUPREMO CLEANOUTS can be used to reduce building maintenance costs.

Supremo Clean-
floor level type,
ahead of floor



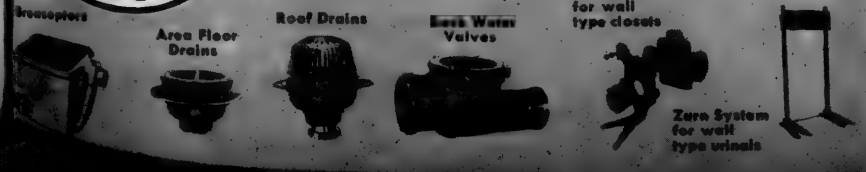
Z-1300 Supremo Cleanout, for general purpose use.

Z-1370-2, Round Access Cover, used here to conceal a Z-1300 Supremo Cleanout.

Z-1375-1 Square Access Cover, neatly conceals a Z-1300 Supremo Cleanout.

Copies of the SUPREMO CLEANOUT Manual will be sent on request. Write on business letterhead or attach coupon below.

ZURN
PLUMBING DIVISION PRODUCTS INCLUDE EVERYTHING FOR DRAINAGE SYSTEMS FROM ROOF TO BASEMENT



J. A. ZURN MFG. CO., Plumbing Division
Erie, Pa., U. S. A.

Please send my copy of the new Supremo Cleanout Manual.

Name and Title .....

Company .....

Street .....

City and State .....
(Dept. 925 HV)

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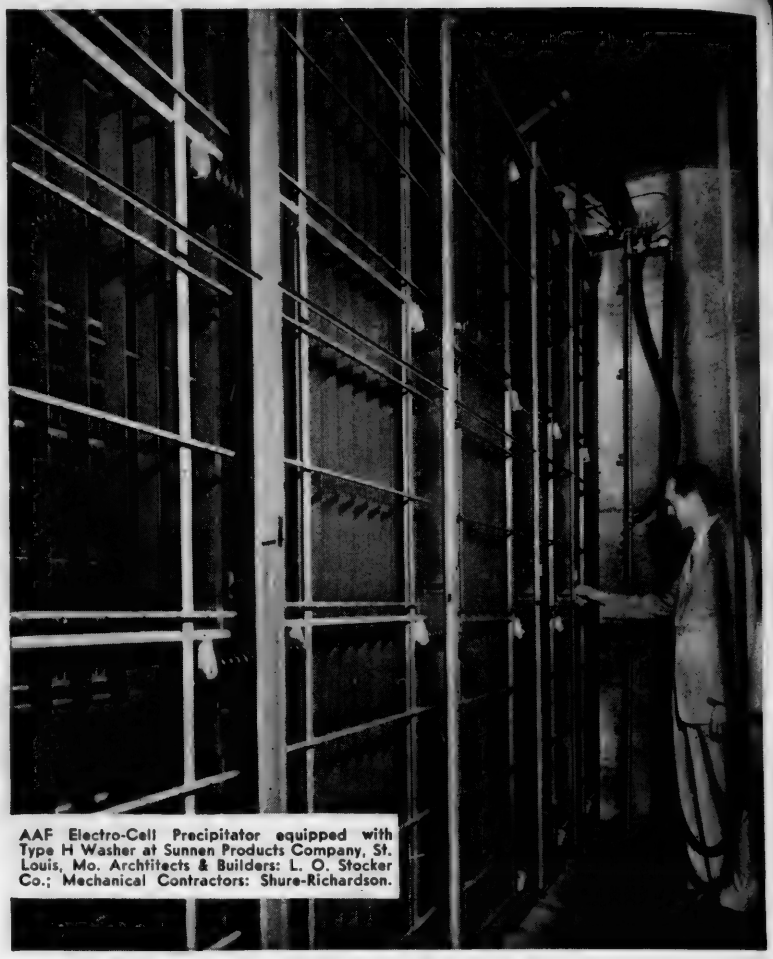
SUNNEN

SELECTS AAF

PRECIPITATOR THAT

Washes its Face Automatically!



AAF Electro-Cell Precipitator equipped with Type H Washer at Sunnen Products Company, St. Louis, Mo. Architects & Builders: L. O. Stocker Co.; Mechanical Contractors: Shure-Richardson.

Electro-Cell Precipitator with Type H Washer supplies super-clean air for office and plant of St. Louis manufacturer

As manufacturers of quality automotive maintenance equipment, Sunnen Products Company are "precision minded". They wanted filters that would deliver super-clean air continuously without the constant "mothering" of a maintenance crew. Their logical selection—the AAF Electro-Cell Precipitator with Type H Washer.

Dust, soot and even smoke are "easy pickin's" for the high efficiency Electro-Cell Precipitator. With the addition of the Type H Washer the complete cleaning operation is done automatically with the mere push of a button.

Easy? Let's push the button and see what happens. First, the spray header moves back and forth across the face of the plate cells, washing away the accumulated dust and dirt. After a five-minute drying period, an adhesive coating is applied to the clean collector plates through another set of spray nozzles mounted on the traveling header. Each operation is automatically timed. Each side of each plate receives a thorough washing and even application of adhesive over its entire depth. That one press of the button does the *complete* cleaning job.

A high efficiency precipitator with a dependable, always available maintenance crew "built-in"—that's the AAF Electro-Cell with Type H Washer. For complete product information, call your local AAF representative or write direct.

AAF

American Air Filter

COMPANY, INC.

American Air Filter of Canada, Ltd., Montreal, P. Q. • 294 Central Avenue, Louisville 8, Kentucky

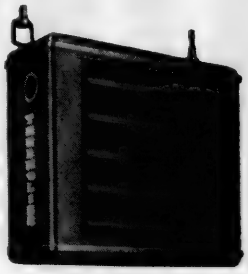
HEAT

where you want it
when you want it

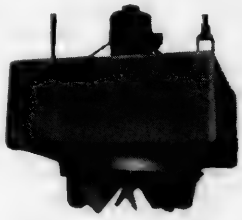
whatever the fuel you use

GRINNELL UNIT HEATERS

Horizontal Gas-Fired Model for natural, manufactured, mixed and LP Gases.



Horizontal Model for steam and hot water systems.



Vertical Model for steam and hot water systems.

Grinnell quality is well known. The "Grinnell" name is backed by over 60 years of heating experience. Regardless of the type and model you choose, you can depend on a Grinnell Unit Heater to give balanced heating performance plus maximum fuel economy. Call on Grinnell . . . for the unit heater to meet your specific needs.

GRINNELL
Gas-Fired Unit Heater

Available in 7 sizes — ranging from 25,000 to 200,000 Btu per hour input

Grinnell Gas-Fired Unit Heaters are easy to install, simple to operate and maintain. Efficient performance is assured — with any type of gas — by modern design of burners and heat exchanger, proper motor and fan unit. Automatic safety pilot operates to shut off main gas supply if pilot goes out. Flashback and extinction noise prevented by the burners' raised port design and proper port size for the gas used. American Gas Association approved.

GRINNELL THERMOLIER
Steam/Hot Water Unit Heater

4 models . . . 18 sizes — from 35,600 to 275,300 total heat delivered, Btu per hour

Three basic models—horizontal, vertical and a special horizontal Textile model. (Adjustable velocity nozzle also available for use on horizontal models.) All models have plain thermostatic trap, the simplest and least expensive kind of a trap, made practical because of unit's exclusive internal cooling leg; maximum capacity provided and destructive water hammer eliminated by built-in pitch of tubes. Many other important features.

GRINNELL
WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

EASY TO INSTALL!

Chase Copper Tube for Soil, Waste and Vent Lines Requires Fewer Joints

Chase Copper Drainage Tube comes in 20 foot lengths. That means fewer joints for soil, waste and vent lines. You'll save time not only in installation but in final pressure-testing, too.

Because it's light but rugged, Chase Copper Tube joined with Chase Solder-Joint Fittings allows you to do a considerable amount of economical pre-assembly.

You can stand by every drainage job you do with Chase Copper Tube because it can't clog with rust and stays pressure-tight. Place your next order for drainage tube at your Chase wholesaler.

Chase

BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass & Copper

Albany†	Chicago	Denver†	Kansas City, Mo.	Newark	Pittsburgh	San Francisco
Atlanta	Cincinnati	Detroit	Los Angeles	New Orleans	Providence	Seattle
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Boston	Dallas	Indianapolis	Minneapolis	Philadelphia	St. Louis	(†sales office only)

From where we sit

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has the finest dealer set-up in the business

FACTORY COOPERATION

right on up to the President! No other company works so closely with you!

ON-THE-SPOT DISTRICT MANAGER

always ready to iron out your toughest problems.

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means your sales will stick. Finest quality components. Fewer service headaches.

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right in your own territory to give you the latest on engineering and selling.

Pull up your chair

- Commercial Air Conditioners
- Residential Year-Round Units
- Home Conversion Units
- Room Air Conditioners
- Packaged Heat Pumps

TYPHOON AIR CONDITIONING CO., INC.

505 Carroll Street, Brooklyn 15, N. Y.

Typhoon Air Conditioning Co., Inc. V4
505 Carroll St., Brooklyn 15, N. Y.

I would like to know more about the Typhoon Franchise.

Name_____

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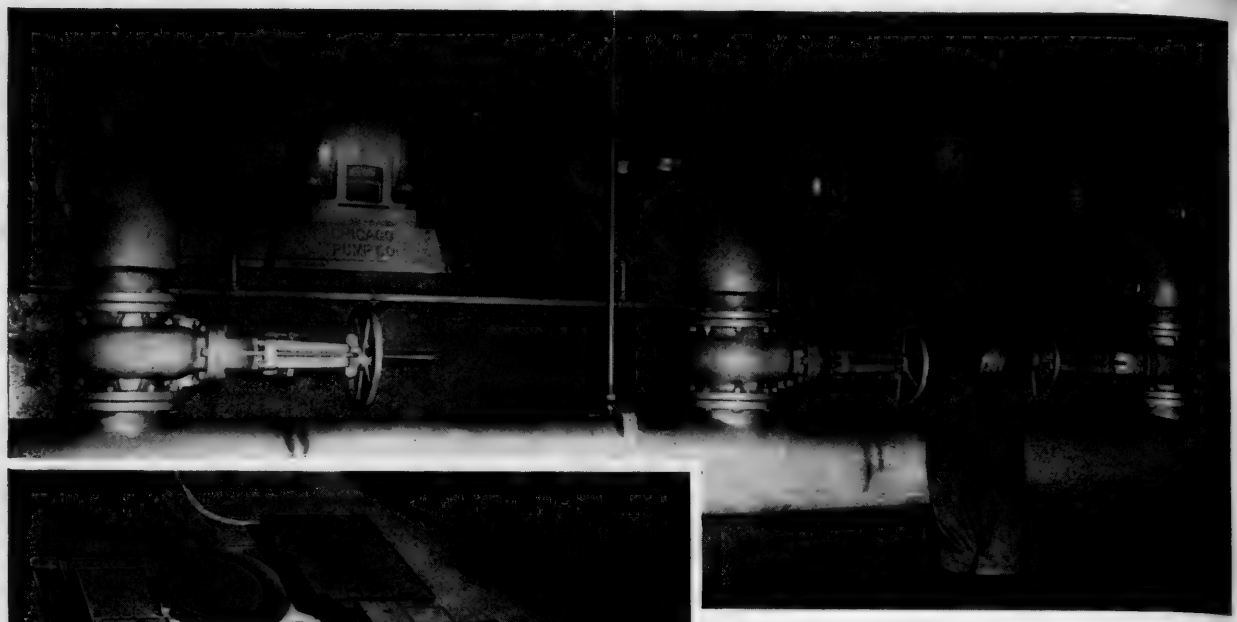
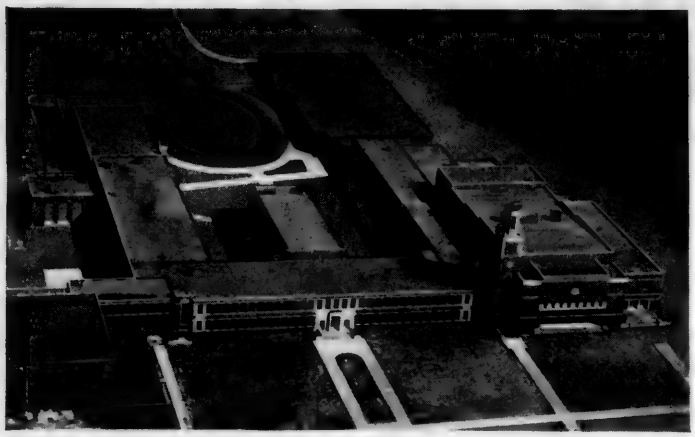




Three Chicago Type D Centrifugal Pumps powered by 25 H. P. motors provide efficient hot water circulation at the Parma, Ohio, Senior High School. Two pumps handle normal loads, the third serves as a stand-by.

The new Parma, Ohio, High School
Architects—Fulton, Krinsky and Dela Motte
Contractors—The Feldman Bros. Co.

QUALITY PAYS HERE . . .

Quality that pays off in the long run was the guiding thought when the Senior High School at Parma, Ohio, was built recently. Costing $5,000,000, the ultra-modern building houses educational facilities for more than 1,500 students. Several hundred rooms, ranging from classrooms to spacious auditoriums and gymnasiums, are heated with hot water circulated to convectors installed throughout the building.

Nothing was spared to make the heating plant efficient and trouble-free. According to Mr. George Rose, long-time heating engineer with the Parma Board of Education, who now operates the Parma heating system, "A 'packaged' heating system might have been adequate but we are already noticing better results from our custom installation."

It is significant that Chicago Pumps — the quality choice of leading architects, engineers and contractors for more than 40 years —are used for hot water circulation in this system. The reputation of Chicago Pumps for efficiency and dependability has earned them a place in many of today's outstanding buildings—for circulating, heating, bilge and sewage pumping. Full information is available on all types. Write for descriptive literature.

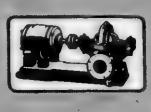
CHICAGO INDUSTRIAL PUMPS

CHICAGO PUMP COMPANY

BUILDING and INDUSTRIAL DIVISION

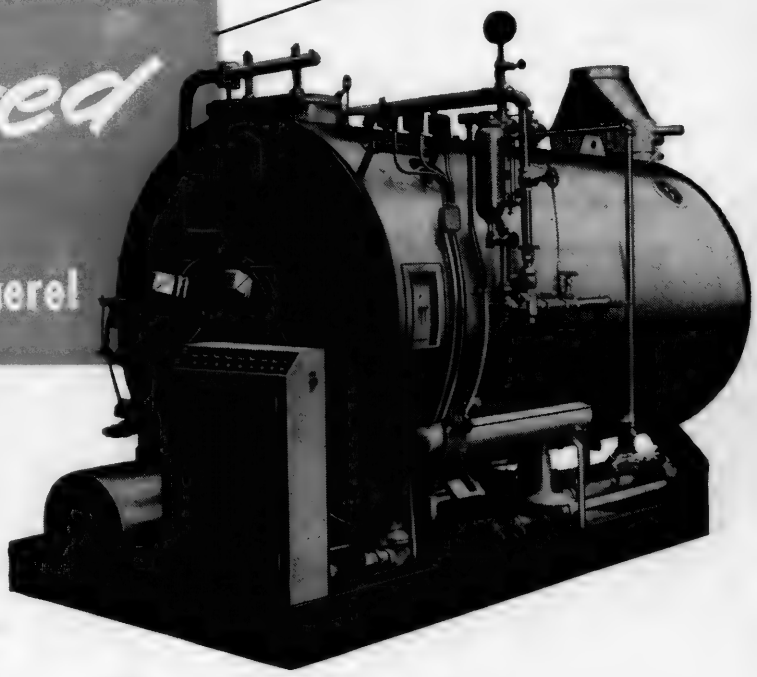
622 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

Condo-Vac, Sure Return. AVC, LVC, Fire, House & Circulating Pumps Pneumatic & Tankless Water Systems.



Flush-Kleen Sewage Ejectors Little Giant & Non-Clog Bilge Pumps Pumps for every industrial use.

Packaged Heat
—dependable everywhere!



the TITUSVILLE Ticosteam Generator

A complete unit—factory tested, factory certified, conservatively rated, using any fuel oil or gas, or combination—equipped with modern safety features.

The wide range of applications enjoyed by the TICOSTEAM Generator reflects Titusville know-how of more than 90 years in building boilers to meet every trend in demand. This self-contained package unit is completely dependable, easy to install, economical to operate and simple to maintain—meeting modern heating and power requirements to the last detail.

For your copy of informative Bulletin B-3100, write!

TITUSVILLE IRON WORKS CO. TITUSVILLE, PA.

A division of Struthers Wells

THE TITUSVILLE IRON WORKS COMPANY

TITUSVILLE, PENNSYLVANIA

Manufacturers of **A Complete Line of Boilers for Every Heating and Power Requirement**

"We wanted minimum cost, maximum efficiency over a 20-year period"

—DR. W. F. WALDECK, DIRECTOR OF RESEARCH AND DEVELOPMENT, WYANDOTTE CHEMICALS CORP.

All air in new Wyandotte Research Laboratories is cleaned, conditioned, humidified, then distributed by American Blower fans.

...AMERICAN BLOWER *was specified!*

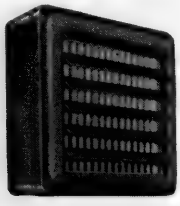
Choosing the right air handling equipment was a must in designing Wyandotte Chemicals' new multi-million dollar research building. Dr. W. F. Waldeck, Director of Research and Development, stated the objectives: "Minimum cost over a 20-year period and maximum convenience and efficiency for every phase of our research work."

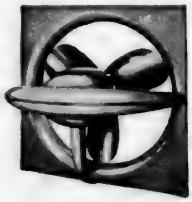
After careful study, American Blower air handling equipment was specified for its dependability and quiet operation.

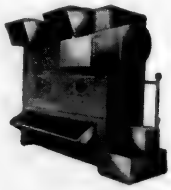
All air for Wyandotte's new research building is conditioned, washed and filtered, with each laboratory hood an integral part of the conditioning as well as ventilating systems. Each hood has an individual, two-speed exhaust fan—the chemist himself controls room and hood ventilation. Secondary air is automatically provided in each laboratory when the hood exhaust fan is turned to high speed.

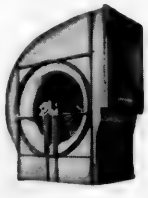
American Blower engineers have a complete knowledge of the air cycle and the special problems of many industries. Let their experience work for you. Whenever you have an air handling problem, give your nearest American Blower or Canadian Sirocco Office a call.

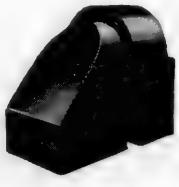
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation


Unit Heaters


Ventura Fans

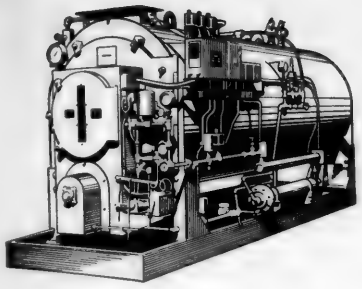

Air Conditioning Equipment


Sirocco Fans


Utility Sets

YOUR BEST BUY AMERICAN BLOWER AIR HANDLING EQUIPMENT

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS



An Engineer Tells WHY Continental Boiler Tube-Sheets Have Long Service Life

"Pictured here is the rear tube-sheet of a packaged boiler, where the combustion gases at high temperature emerge from the furnace and sweep over the tube-sheet to enter the return tubes. Tube-sheet and tube ends are exposed to intense heat which may overheat the metal and cause serious damage.

"Tough problem . . . but the Continental features a simple solution:

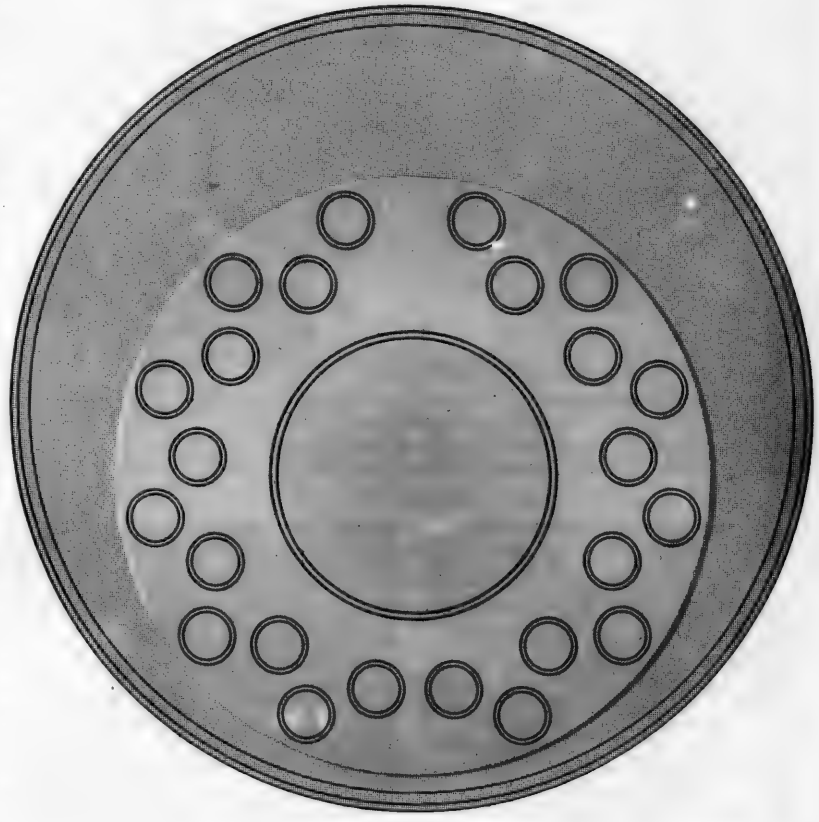
"(1) It provides equal flow of combustion gases to all return tubes so that all heating surfaces are equally effective.

"The Continental Boiler's two-pass design enables the hot combustion gases to transmit heat uniformly to the tube-sheet and tubes, thus making all surfaces equally effective.

"(2) The Continental Boiler provides adequate water circulation by proper arrangement of furnace and return tubes.

"It is essential that the large amount of heat carried to the tube-sheet and tube ends be quickly transferred to and absorbed by the boiler water. Sluggish circulation caused by close packing of return tubes may cause a heat block — with resultant overheating and damage to the metal.

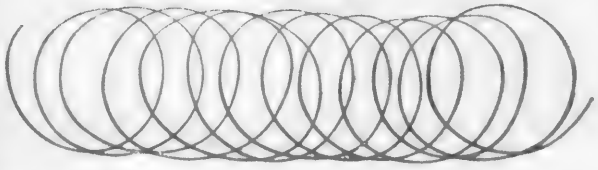
"Note the symmetry of tube layout in the Continental Boiler. There is uniform distribution of heat over the entire tube-sheet . . . equal loading of all return tubes . . . free and balanced water circulation space — with single pass of return tubes."



EFFICIENCY — guaranteed over 80% for all sizes of Continental Boilers, from 20 to 500 hp. Dependable, trouble-free operation — for steam heating at pressures from 15 to 250 pounds . . . or for hot water heating at low or high temperatures.

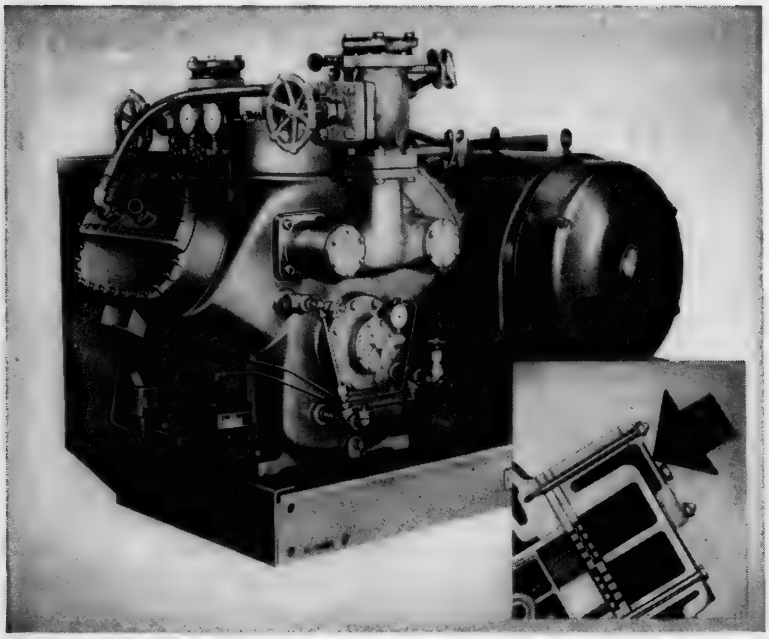
Write for Bulletins BE3 and BE4.

CONTINENTAL . . .
the boiler with the spinning gas technique



CONTINENTAL
Automatic Boiler
Manufactured by:
BOILER ENGINEERING & SUPPLY CO., INC.
Phoenixville, Pa.

Look at all the features of Worthington's new high-speed ammonia compressor



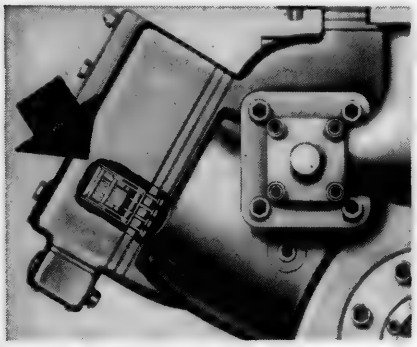
IMPROVED INTERNAL MANIFOLDING—cool suction gas completely surrounds the cylinder walls, providing longer valve life and increased overall efficiency. All passageways between suction discharge and shutoff valves are cast integrally within the crankcase, eliminating outboard fittings. Cross section shows water jacketing on one of the cylinders.

High operating efficiency and lighter weight make this modern unit the talk of the industry

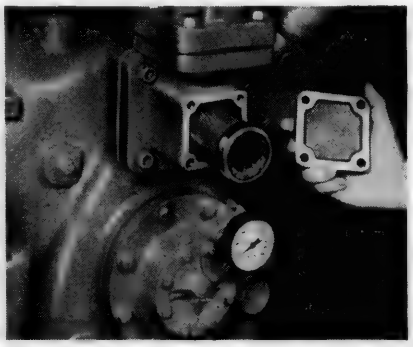
These lightweight, compact Worthington ammonia compressors have the same high operating efficiency and versatility as their lower speed counterparts.

Ranging in capacities from 18 to 150 tons, the new units can be used as high-stage or booster machines.

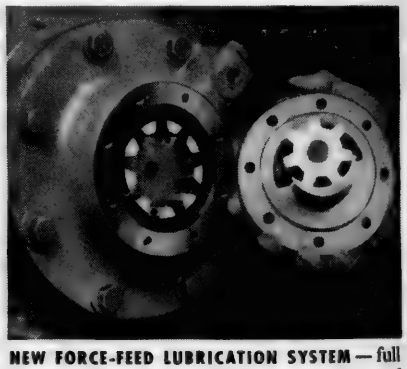
Get in touch with your nearest Worthington district office for more facts about these rugged compressors. Or write to Worthington Corporation, Air Conditioning and Refrigeration Division, Section A.3.56, Holyoke, Mass.



ELECTRIC UNLOADING—a new achievement in variable capacity control. You can start compressor with a normal torque motor; power consumption is automatically balanced against load. Separate unloader units allow easy maintenance . . . no oil or gas pressure lines to worry about.



NEW SUCTION MANIFOLD, with cover plate over suction strainer inlet, allows easy removal of the suction gas strainer for cleaning, without disturbing any of the pipes, valves or other parts. The strainer is unique in that it fits entirely within the crankcase manifold, requiring no additional space.

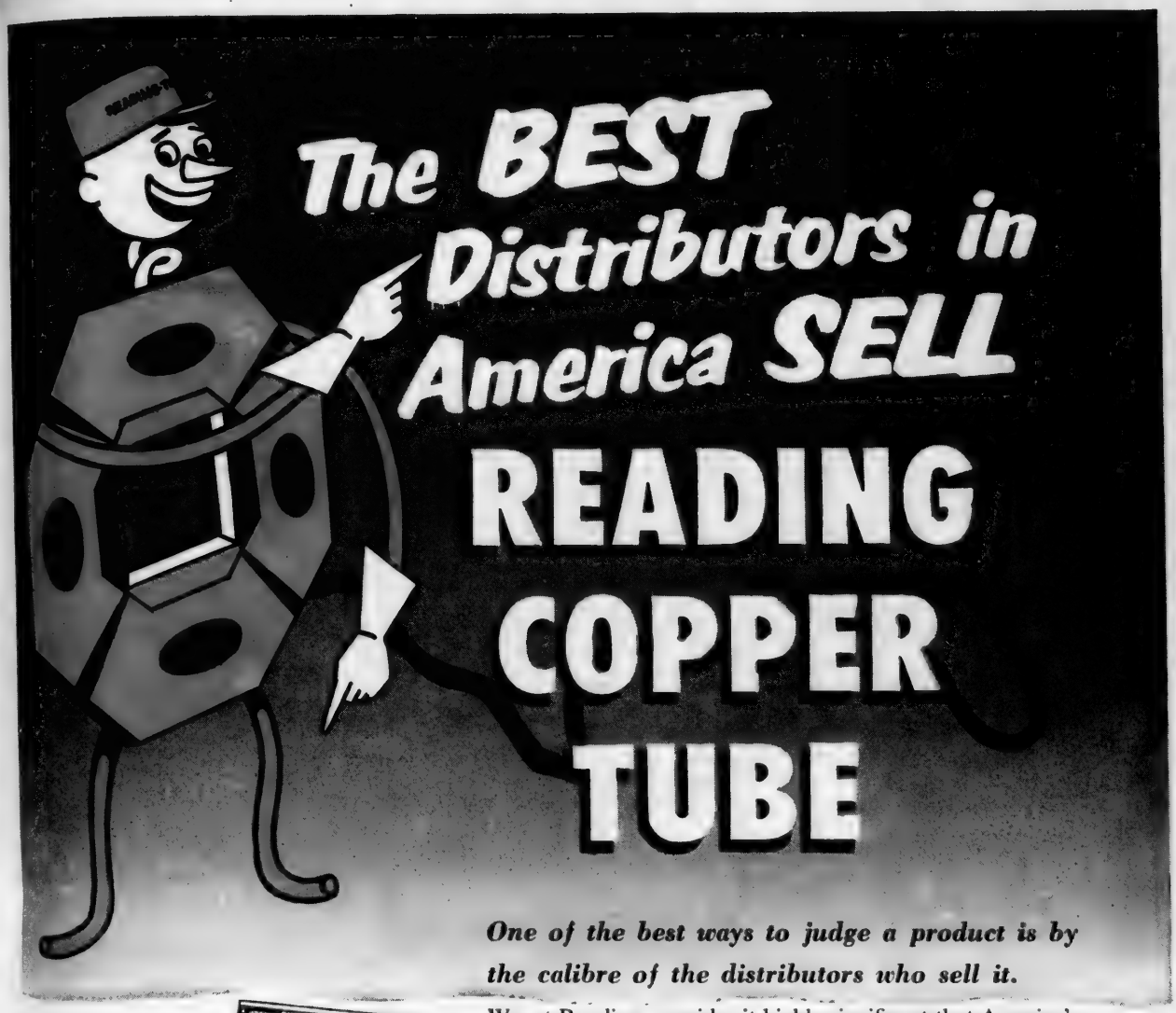


NEW FORCE-FEED LUBRICATION SYSTEM—full pressure, positive lubrication, regardless of rotation. A new rotary oil pump, driven directly by the crankshaft, eliminates complicated and noisy gear trains. Oil is filtered through a strainer in the crankcase for protection of pump and other moving parts.

A.3.56

WORTHINGTON

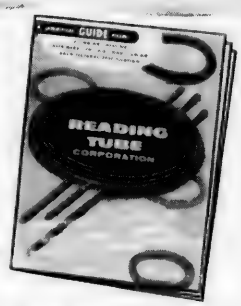
CLIMATE ENGINEERS TO INDUSTRY, BUSINESS AND THE HOME



The BEST Distributors in America SELL READING COPPER TUBE

One of the best ways to judge a product is by the calibre of the distributors who sell it.

We, at Reading, consider it highly significant that America's leading distributors have chosen Reading Copper Tube to sell and recommend. These distributors build their business by handling the finest products — products whose quality and performance they can depend on to uphold their reputation for giving customer satisfaction. Of equal importance to them is service. And they know from experience that Reading's streamlined, shirt sleeve service eliminates delays . . . speeds delivery from factory . . . to distributor . . . to contractor. Next time you need copper tube . . . specify Reading . . . precision product of one of America's largest, completely integrated mills, specializing in the processing of copper tube from basic metal to finished tubing . . . and sold by America's best distributors.



NEW CATALOG

Reading's New 32 page guide for Copper Water Tube, Copper Refrigeration Tube, and Red Brass and Copper Pipe is now available. Write for your free copy today.

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What's YOUR heating job?

STEAM?

Modine builds 28 sizes of vertical delivery units—14 for standard and 14 for low outlet temperatures—with choice of four easily attached deflectors. There are also 19 horizontal and ten power throw models for standard and low outlet temperatures.

HOT WATER?

Vertical delivery units come in 14 sizes with a choice of 4 easily attached deflectors. Five horizontal models are designed specifically for hot water. Five power throw models are also available.

GAS?

Only Modine gas-fired unit heaters have stainless steel burners and a choice of stainless or aluminized steel heat exchangers. Seven sizes—25,000 to 220,000 Btu. A.G.A. and C.G.A. approved for natural, mixed, manufactured, LP and LP-air gases.

You name it— Modine has the unit heater to do it better . . . at lower cost

WHATEVER your unit heating needs, you can depend on Modine for maximum heating comfort at lowest possible fuel cost. For over 25 years, the Modine name has been synonymous with quality and advanced engineering.

Take steam and hot water unit heaters, for example. Discharge air temperatures of 110-120° F are correctly related to air velocity for heating at its best. There's minimum heat loss compared to some units that discharge air at such high temperatures that it immediately rises to the ceiling, or others with velocities so low that the heat reaches only a small area.

As for gas-fired unit heaters, Modines are only half the weight, half the size of other leading makes. You save installation costs, save on shipping charges. And this same advanced design means longer life, five-second heating response to thermostat's demand.

Yes, from every angle . . . for every job—you're way ahead when you specify Modine unit heaters. You'll find it pays to buy the greatest name in unit heating.

For facts on steam and hot water unit heaters, see the Modine representative listed in your classified phone book. Or write today for your copy of Catalog 154.

Get complete information on gas-fired unit heaters. Write for Bulletin 654 to Modine Manufacturing Company, 1511 DeKoven Avenue, Racine, Wisconsin.

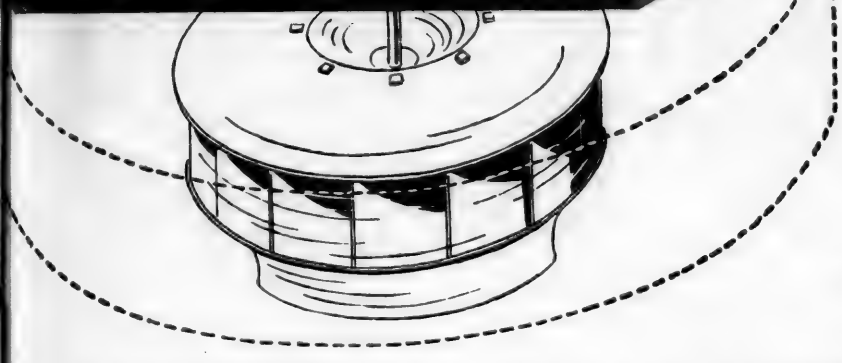
U-1231

Modine UNIT HEATERS

OUT OF THE "BUFFALO"

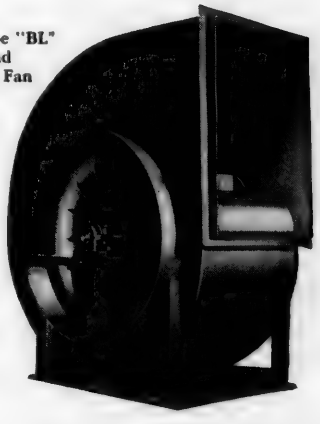
PUNISHMENT PIT—

COME BETTER FANS FOR YOU



"Buffalo"
Axial Flow Fan

"Buffalo" Type "BL"
Limit-Load
Ventilating Fan



• To be sure that "Buffalo" rotors can stand far greater stress than they would ever encounter in an installation, we deliberately try to destroy them in this "Buffalo" vacuum test pit! Here, in a partial vacuum, the rotor to be tested can be revolved at tip speeds as high as 60,000 and even 70,000 feet per minute. The slightest unbalance, the slightest structural weakness, would result in destruction of the rotor at these fantastic speeds — and it shows up here in the Punishment Pit, not in the installed fan.

This is just one phase of the rigid testing and excellence of engineering, or "Q" Factor*, which assure you of a best buy when you specify "Buffalo" Fans. Why not write for "Buffalo" engineering literature on *your* air handling problem?

•

**The "Q" Factor — The built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo"

BUFFALO FORGE COMPANY

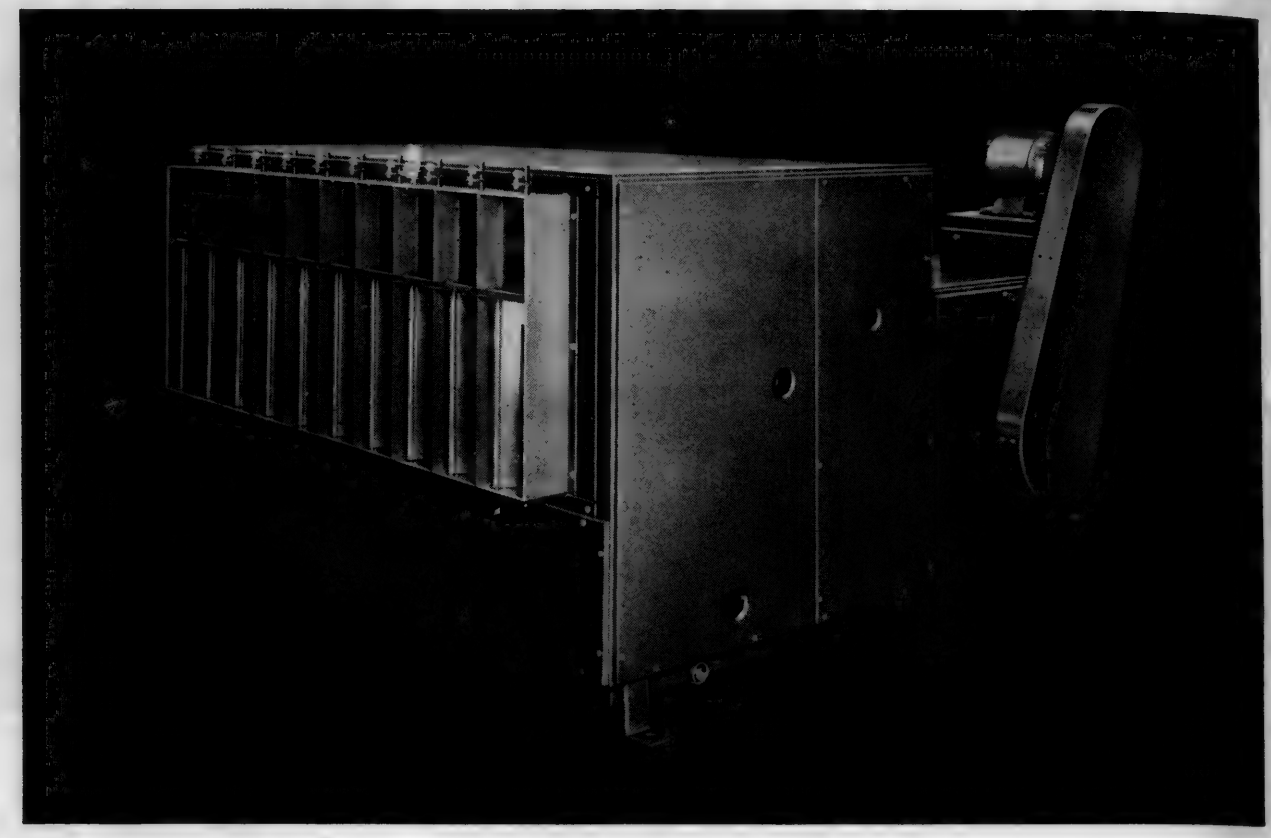
480 BROADWAY BUFFALO, NEW YORK

Publishers of "Fan Engineering" Handbook

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

NTILATING PRESSURE BLOWING AIR CLEANING COOLING AIR TEMPERING HEATING INDUCED DRAFT FORCED DRAFT EXHAUSTING



Now...A Westinghouse Multi-Zone Unit Automatically Conditions Air— Up to 12 Independent Zone Areas

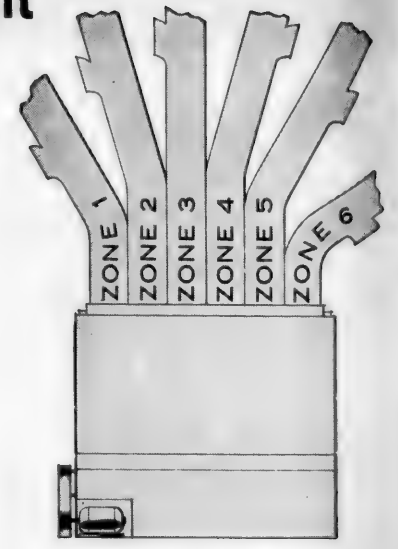
This rugged, compact central plant air conditioning unit supplies air, conditioned for simultaneous unequal heat load demands, in various zones requiring individual temperature and humidity control.

Formerly, heat load variations caused by differences in building construction, changes in occupancy, wind or solar exposure, could be controlled only by separate supply systems for each zone or by expensive zone reheat arrangements.

Now . . . this problem can be solved with a single Westinghouse Multi-Zone Air Conditioning Unit. Efficient . . . economical . . . this versatile unit supplies air—conditioned at a central location—for the individual needs of as many as 12 zones.

This complete unit—fans, coils, motors and starters—is designed and manufactured by Westinghouse, permitting a single equipment warranty with undivided responsibility . . . an exclusive feature in all Westinghouse Air Handling Units.

For complete information about this outstanding advance in central plant air conditioning, call your nearest Sturtevant Sales Engineer today. Or write: Westinghouse Electric Corporation, Sturtevant Division, Boston 36, Mass.



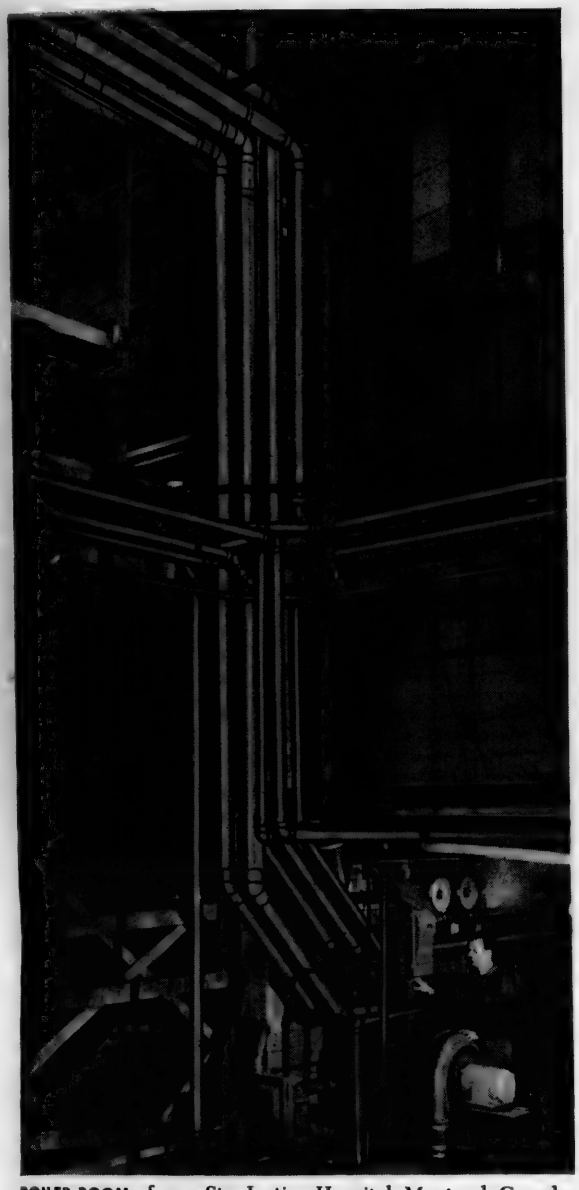
TOP VIEW
(FOR SIX ZONES)

Multi-Zone Units are of the blow-through type with divided outlets to serve multiple zones by supplying heated or cooled air, or controlled mixtures of both, to each zone.

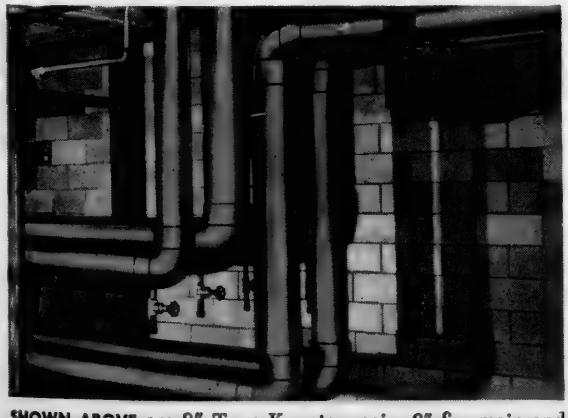
WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE...IF IT'S Westinghouse

J-80393



BOILER ROOM of new Ste. Justine Hospital, Montreal, Canada. Architect, Joseph Sawyer. Associate architect, Henri S. Labelle. Consulting engineers, Leblanc & Montpetit. Distributor, James Robertson Co., Ltd. All the above firms are located in Montreal, as is the Industrial Plumbing & Heating Co., Ltd. who made the installation.



SHOWN ABOVE are 8" Type K water main, 6" fire main and two 6" hot water lines. Note tubes do not touch steel support. They rest on copper strip welded on U-shape support.

6" and 8" Water Mains of Anaconda Copper Tube installed in new hospital

Copper's non-rusting and corrosion-resistant properties assure long piping life, low maintenance costs

All hot and cold water lines in Montreal's new multi-million-dollar Ste. Justine Hospital are Type "K" Copper Tube. The installation includes 8" tube for the main supply line and 6" tube for the mains serving the hot water system and fire protection lines.

Industrial Plumbing and Heating Co., Ltd., Montreal, who made the installation, has this to say about copper:

"...proved most economical piping material because of complicated layout...made the installation in much less time than it would have taken with pipelines requiring threaded connections...longer lengths meant fewer fittings...solder-type fittings made quickly...easy to handle because of light weight...smaller sizes bent right on the job...able to make connections in close quarters where a threaded assembly would be impossible ..."

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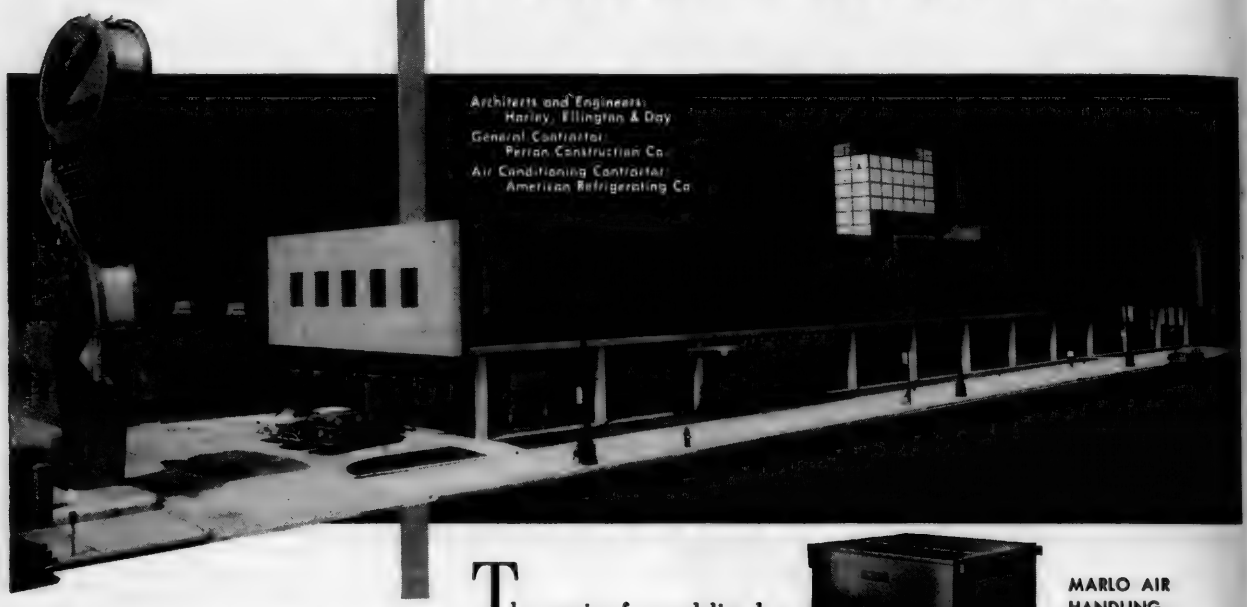

The magic of remodeling has transformed an older Detroit building into a handsome new main office and bottling plant for the James Vernor Company, producers of Vernor's Ginger Ale.

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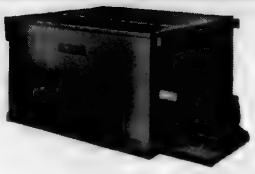

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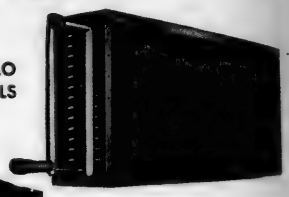

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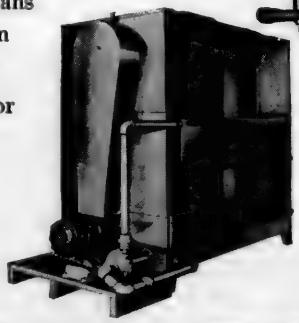

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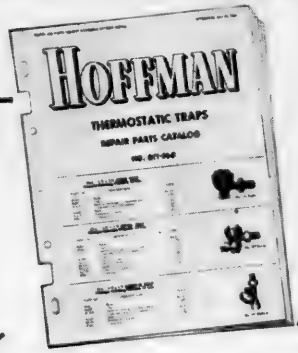

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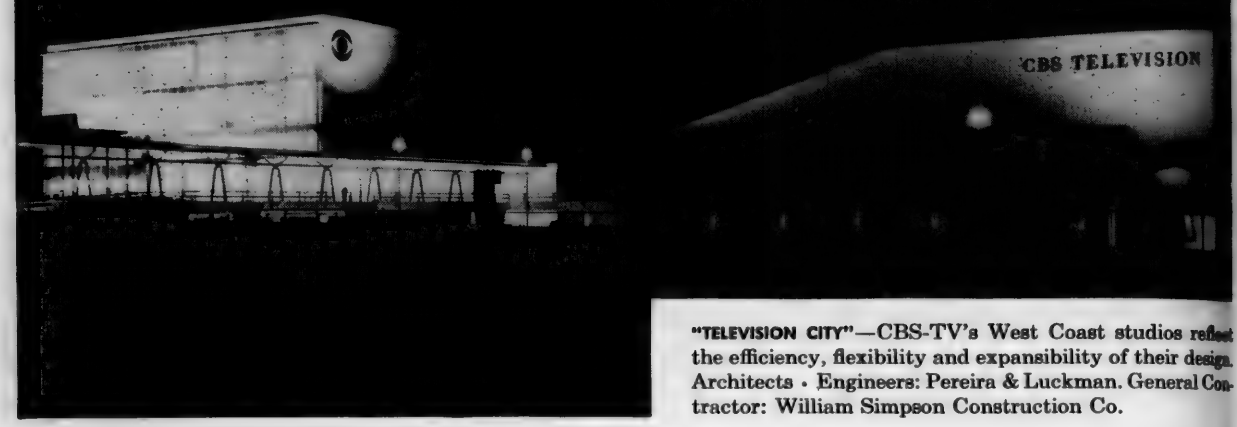

"TELEVISION CITY"—CBS-TV's West Coast studios reflect the efficiency, flexibility and expansibility of their design. Architects • Engineers: Pereira & Luckman. General Contractor: William Simpson Construction Co.

● The Columbia Broadcasting System's clean-lined "Television City" in Hollywood, California is the core of an anticipated 25-acre, 24-studio expansion of the network's West Coast TV production facilities. Plans for future enlargement of the building specify that the present walls be easily demountable. Consequently, most of the exterior is composed of large, plain, movable steel panels and glass walls.

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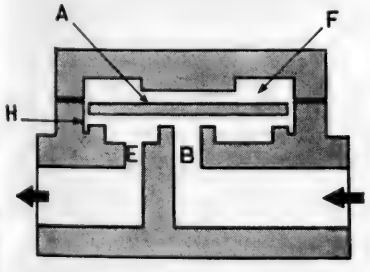

Air and/or condensate raise valve seat disc A, discharge thru E. When steam follows, greater velocity causes it to strike body at H thus building up pressure in chamber F. This causes disc to seat, closing tube B. As pressure in F decreases by condensation, pressure in tube B raises disc and cycle is repeated.

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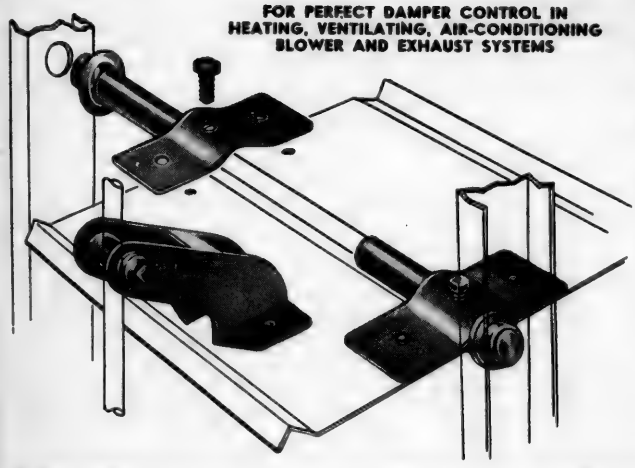

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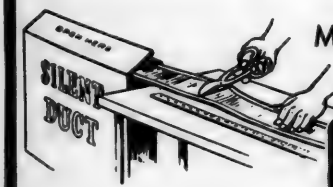

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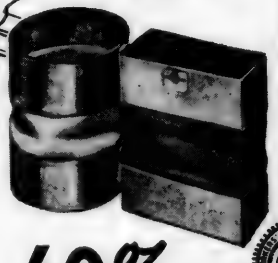

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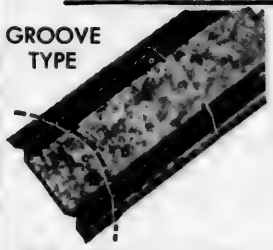

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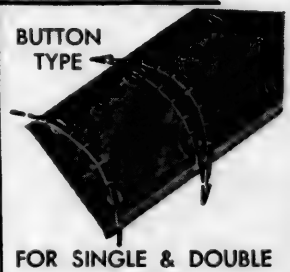

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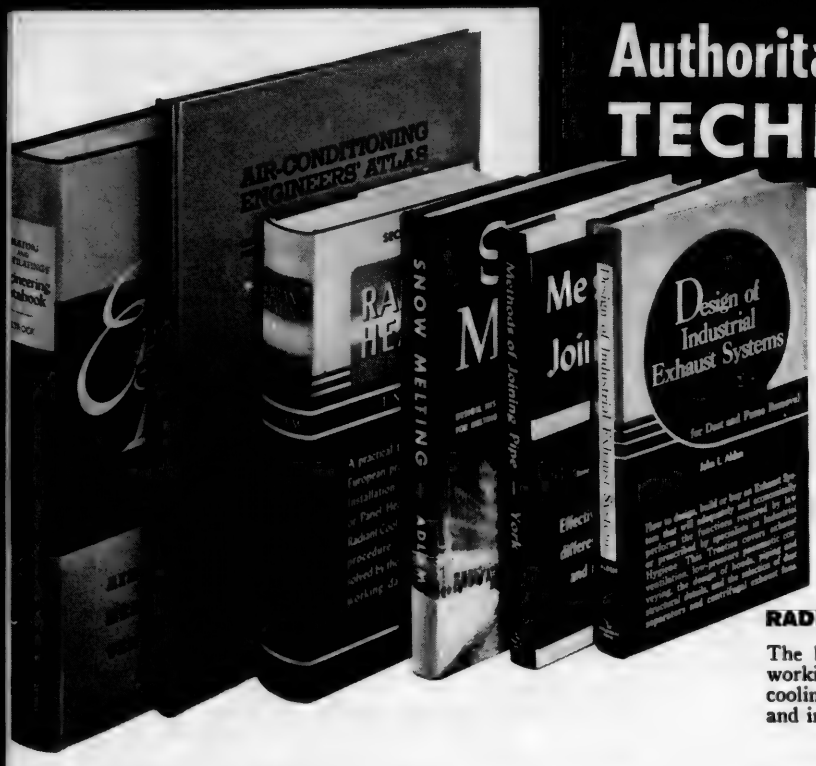

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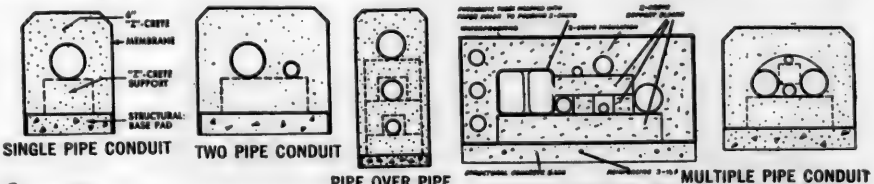

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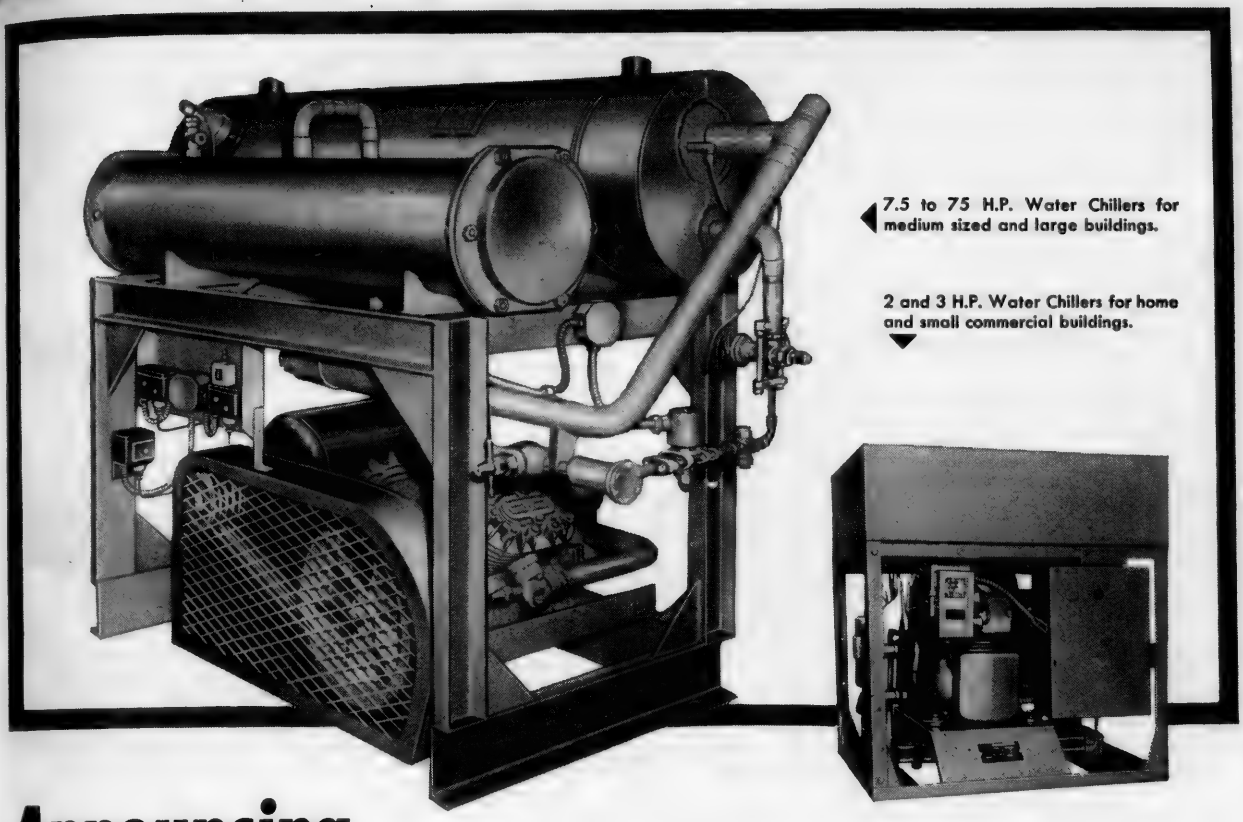

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These new chillers are just the thing for a cold water source for all air conditioning systems. For more information about the new packaged water chillers or the complete Remotaire System, fill out and return the attached coupon to the **American Radiator & Standard Sanitary Corporation,** Pittsburgh 30, Pennsylvania.

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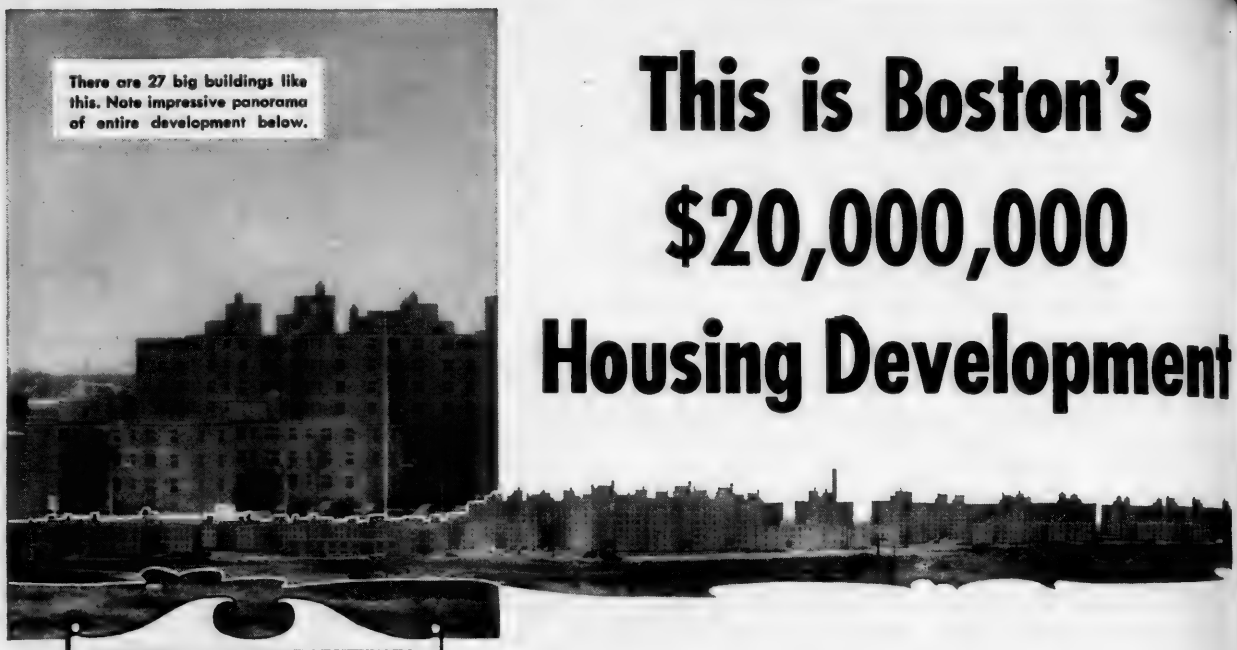

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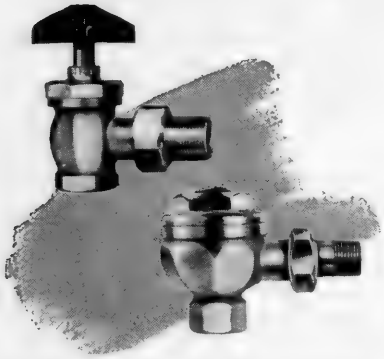
And remember this: no job is *small* enough to gamble on. For your next installation, large or small, use the valves, traps, and vents that have earned the confidence of the most critical heating engineers and contractors.



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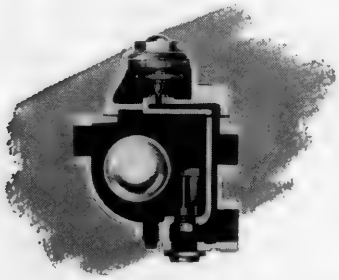

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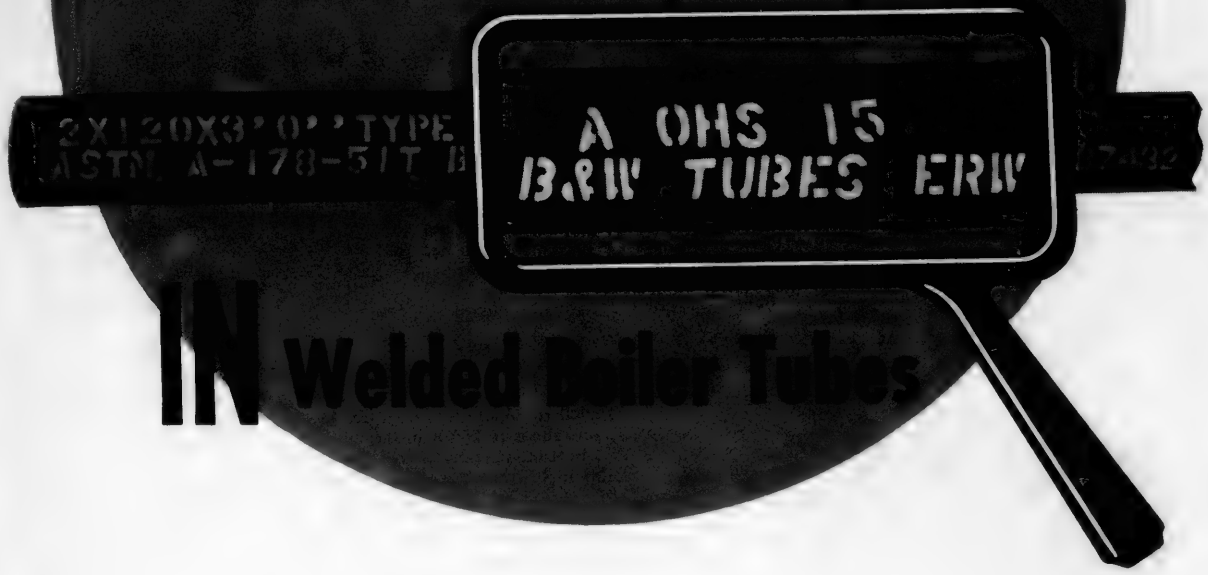

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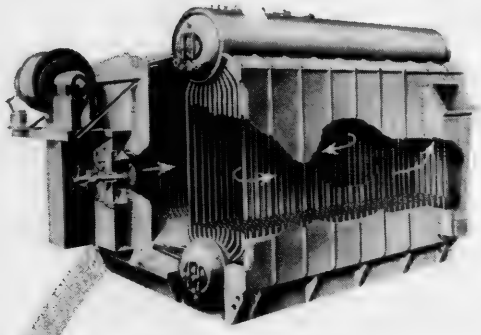
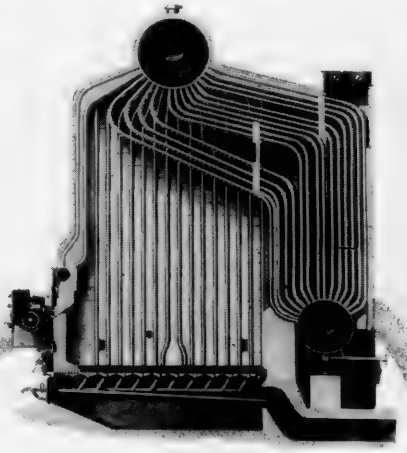


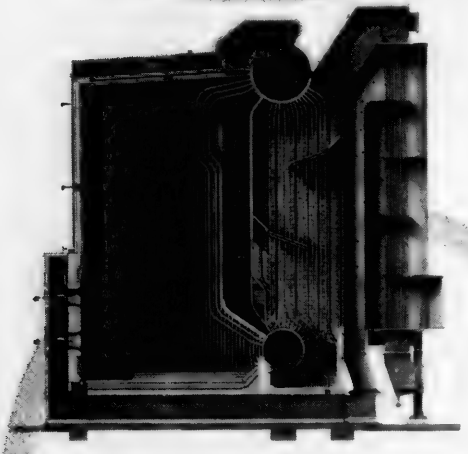
C-E Package Boiler, Type VP

4,000 to 40,000 lb steam per hr . . . pressures to 500 psi . . . for pressure firing of oil or gas . . . completely shop-assembled, needs only simple concrete slab for foundation. Has more water-cooled area per unit of furnace volume than any other boiler of its size and type. Large lower drum permits simple, symmetrical tube arrangement . . . great water storage capacity . . . easy access. Low-speed centrifugal fan is unusually quiet in operation. Simple baffle arrangement means low draft loss . . . simple soot blowing . . . no dead pockets . . . high heat absorption.



C-E Vertical-Unit Boiler, Type VU-10

10,000 to 60,000 lb steam per hr . . . pressures to 475 psi . . . superheat to 200 F in larger sizes . . . for coal, oil or gas . . . bottom-supported, needs no outside supporting steel. Boiler is efficient over a wide range of output, and is easy to operate and maintain. All parts are readily accessible for inspection. Regardless of fuel, the same general cross-sectional arrangement of drums, convection bank and furnace cooling is used. Uniform design through each transverse section assures even water level in drum, and uniform expansion.



C-E Vertical-Unit Boiler, Type VU-55

50,000 to 120,000 lb steam per hr . . . pressures of 250 or 500 psi . . . superheat and heat recovery equipment if desired . . . for oil or gas . . . bottom-supported, needs no outside supporting steel. This boiler is of symmetrical design. Thus gas temperature is constant across the full boiler width. The narrow, high furnace . . . integral design of boiler and preheater . . . absence of exterior ductwork . . . compactness—all help the VU-55 achieve standards of performance closely approaching that of large central station boilers.

Other C-E Industrial Boilers

In addition to the standard boilers shown here, Combustion offers many other 2-drum designs, for capacities to 350,000 pounds of steam per hour, for any commercially available fuel, for pressures to 1375 psi, and temperatures to 960 F. Heat recovery equipment is available. So — whatever your steam needs — call Combustion for details on the complete line of C-E Industrial Boilers.

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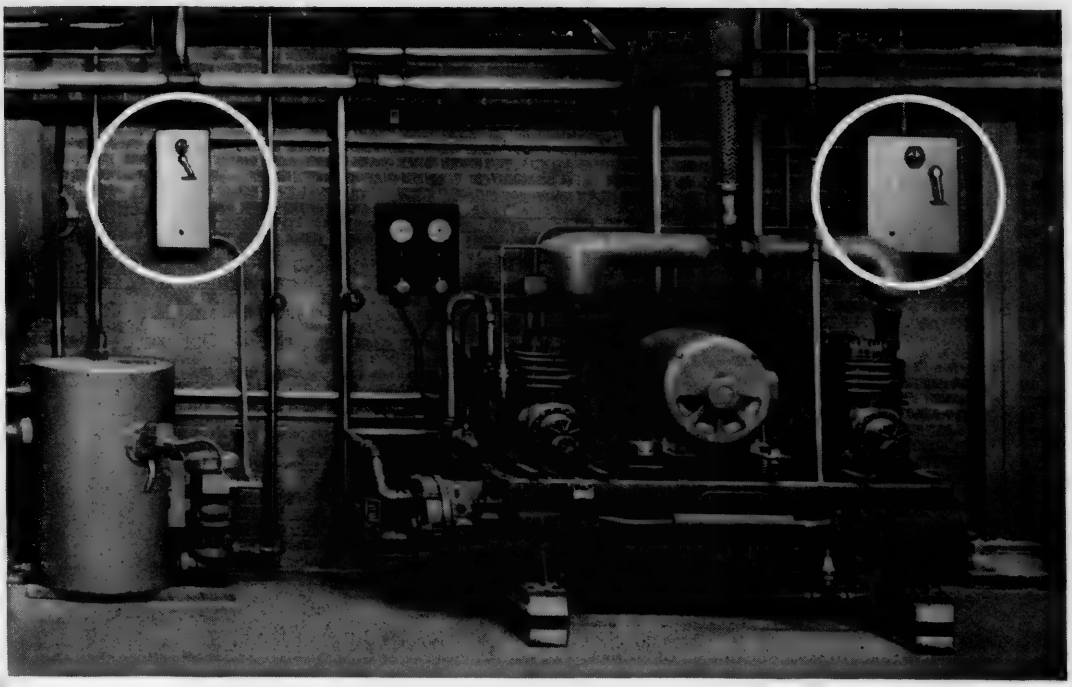

Frigidaire compressor unit operated by Allen-Bradley control.

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ALLEN-BRADLEY

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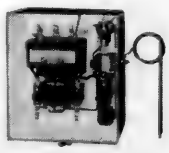

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QUALITY MOTOR CONTROLS FOR HEATING, VENTILATING, AIR CONDITIONING, & REFRIGERATION INDUSTRIES

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Pleasant atmosphere of the waiting room, as well as the operating areas of the terminal, is ideally tempered by Pacific Boilers with *Jet-action* Circulation.

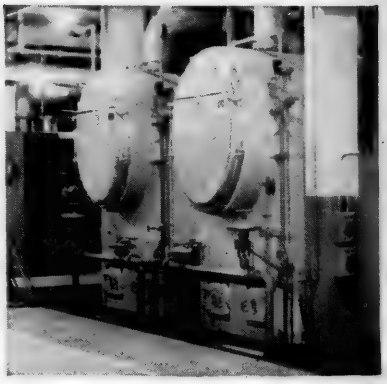
Pacific Boilers with *Jet-action* Circulation temper climate at Fort Worth airport terminal

WHEN temperatures drop at the Greater Fort Worth International Airport, Pacific Boilers go to work quickly and efficiently in the modern new terminal building. Steam is speeded on its way almost instantly . . . for Pacific Boilers—and only Pacific Boilers—have superfast *Jet-action* Circulation!

What's so different about *Jet-action* Circulation? The secret is in Pacific's circulating connections. Like miniature jet nozzles, they blast supercharged streams of steam and hot water across the heating tubes, sweeping away—and keeping away—heat-insulating bubbles that would ordinarily cling to the tubes and slow down heat transfer. Tubes absorb heat faster . . . response is practically immediate!

Your customers would welcome this faster heating action, too! Because, in addition to its quicker response, *Jet-action* Circulation wrings more heat from a given amount of fuel than any other system!

To give your customers this extra efficiency and economy, specify Pacific Boilers. They come in all sizes, for all fuels, for any type building . . . and they are easy to install. For complete data call your Pacific representative today.



These two Pacific Boilers, rated at three million btu per hour each, heat the terminal building. Pacific Boilers make installation easy, because they can be shipped in one, two or three sections, depending on individual requirements.

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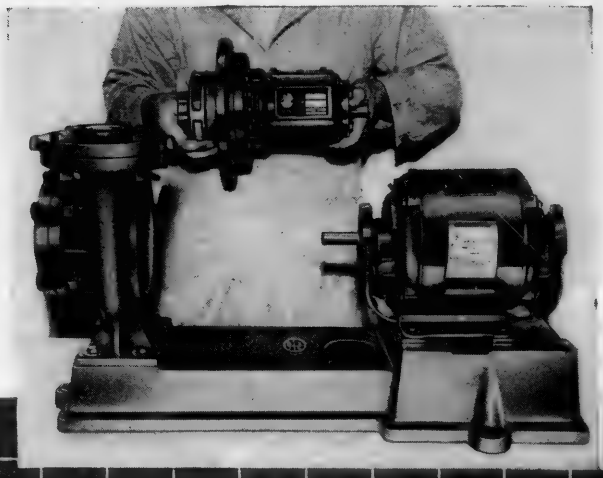
B&G PUMPS ARE *EASIER TO SERVICE*

(BUT SELDOM NEED IT)



"Service" is a word seldom heard in connection with a B&G Pump. Thousands have been in operation for many years without need for attention of any kind! If for any reason, however, service is necessary, you can get to the root of the matter quickly and easily.

Any B & G Booster or Universal Pump can be serviced *without removing from the line!* Removal of a few bolts permits separation of bearing bracket and motor from the pump head—making all parts accessible. Precision manufacturing methods assure positive accuracy of fit and complete interchange of parts between pumps of the same size.

In every detail, B & G Pumps are constructed to (1) operate *quietly*, (2) perform *dependably* and (3) last for *years!* That's why more are sold than any other pump built for the same purpose.

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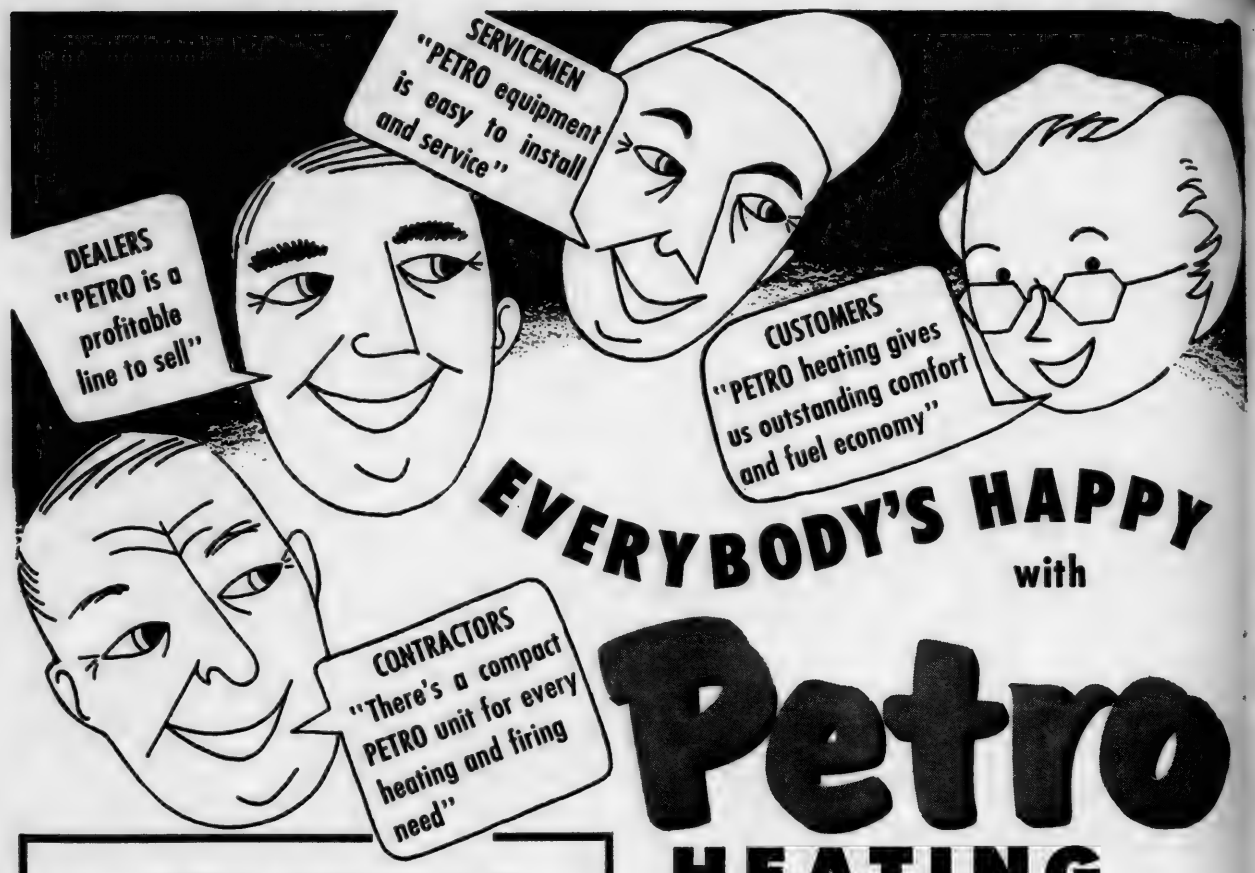
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"PETRO heating gives us outstanding comfort and fuel economy"
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"There's a compact PETRO unit for every heating and firing need"

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Complete winter air conditioners made in popular sizes to fit the heating needs of homes from 4 to 10 rooms. Extremely compact and attractive. Real fuel-savers. Both Highboy and Lowboy models available. Lowboy shown above.

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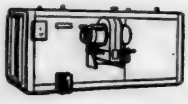
Efficient units for converting your present furnace or boiler to automatic heat. Low in cost and real fuel savers. (Oil unit shown.)



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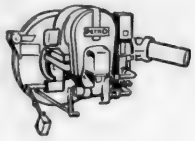
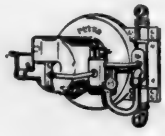
Hang it or hide it—this winter air conditioner fits anywhere. Available in 5 models from 80,000 to 180,000 Btu's (output at bonnet).

INDUSTRIAL OIL BURNERS

Horizontal Rotary cup type oil burners for cold, heated, or tempered oils. Capacities up to 200 gallons per hour.





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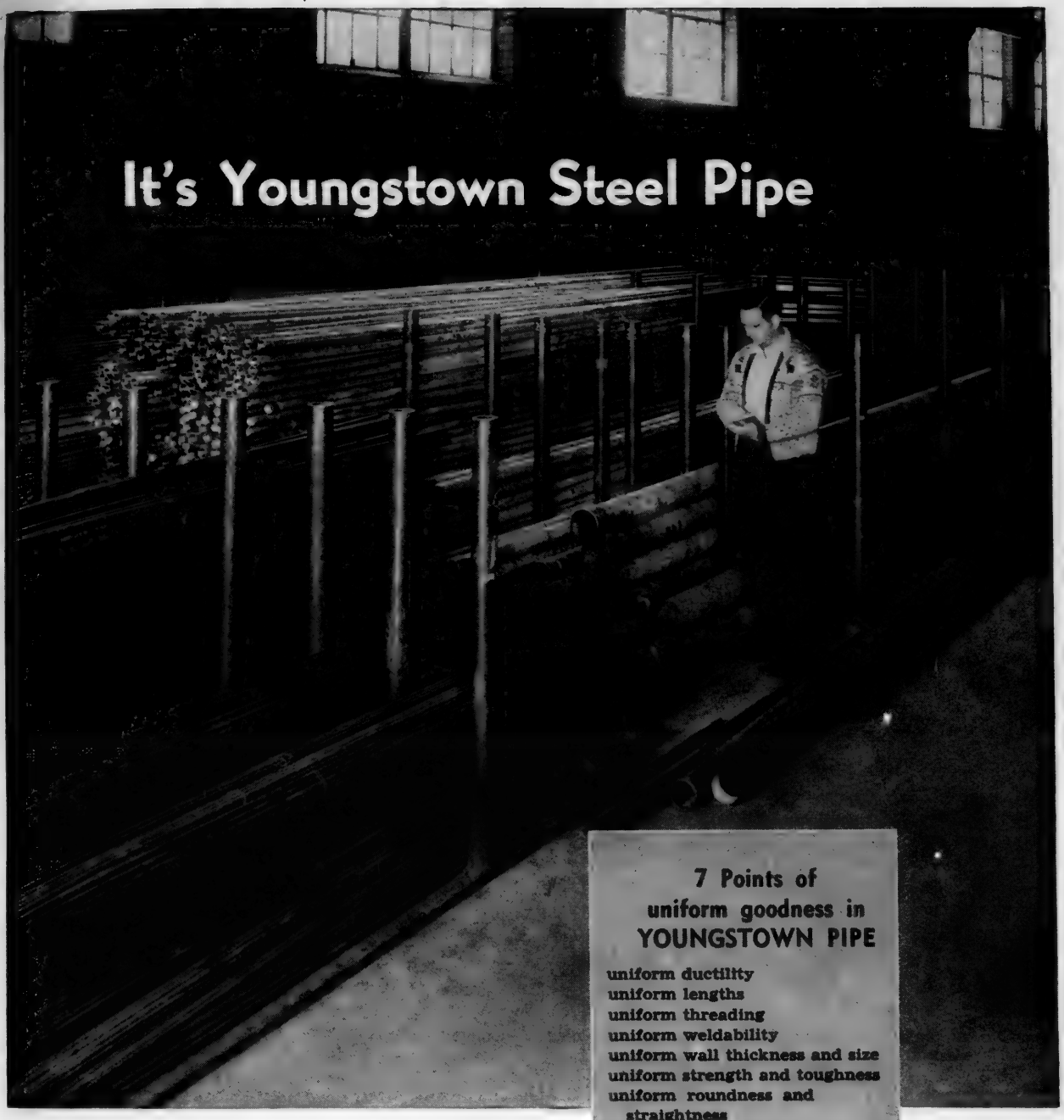

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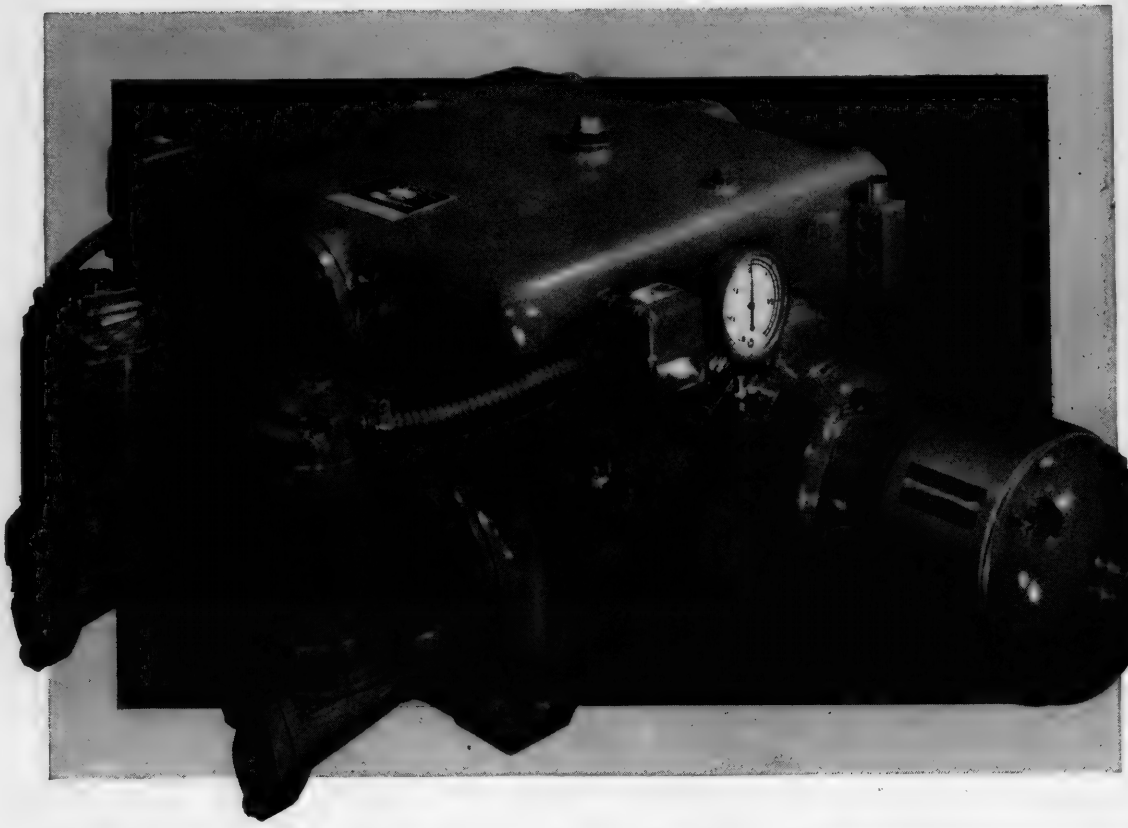
THIS NEW VACUUM HEATING PUMP IS SIZED TO ACTUAL JOB REQUIREMENTS



It's the Nash CSM

No longer is it necessary for the Engineer to accept a vacuum heating pump with air and water capacities based inflexibly upon square feet of equivalent direct radiation. With the flexible Nash CSM he can provide for proper air capacity in accordance with his judgment and experience. For the individual capacities of the separate pumps on the CSM may be varied within a wide range, without buying an oversize receiver and oversize water pumps.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- Increased air capacity induces rapid system response without wasteful overheating.
- Separate air and water pumps individually selected to meet actual job requirements.
- Control system that operates individual pumps only when needed.
- Flexibility permitting addition of radiation without changing basic pump installation.
- Low, low, return line connection.

NASH ENGINEERING COMPANY
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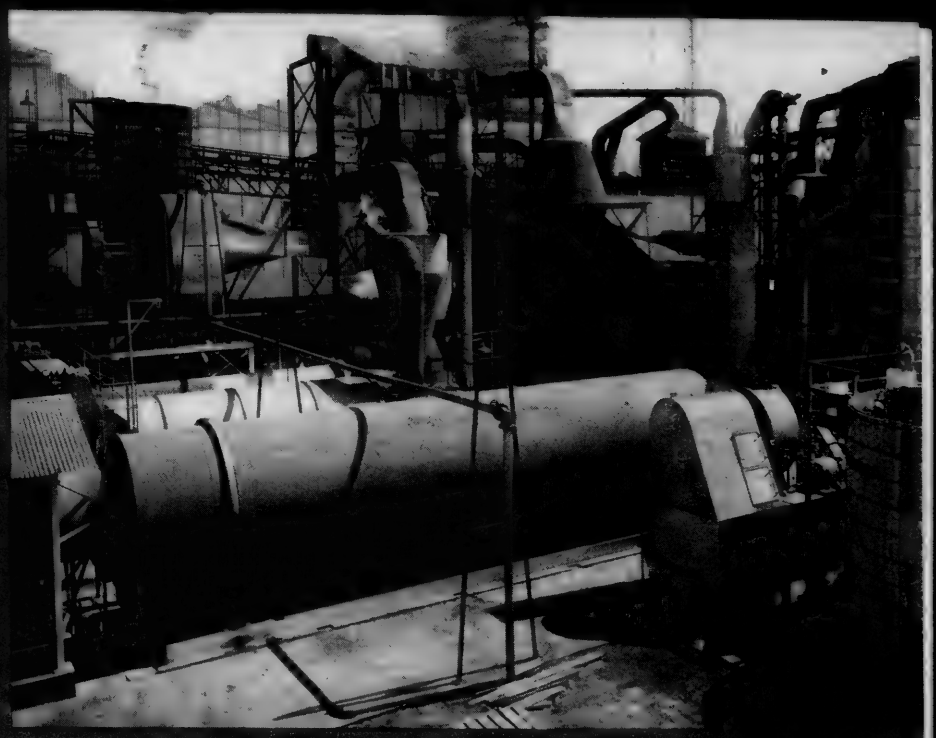


Guides in Dust Collector Selection

JOHN M. KANE

Manager, Dust Control Products, American Air Filter Company, Inc., Louisville, Ky.

Selection of the proper type dust collector for a particular industrial process depends on an understanding of basic data regarding equipment.

ENGINEERS who are confronted with an occasional dust collector requirement, generally rely on the equipment manufacturer for guidance as to the degree of cleaning required, the exhaust volume necessary, and the most suitable control method at the source of dust generation. It is hoped that this group of engineers may be helped by the following observations and tables, through indicating what equipment type manufacturer should be consulted. For example, it would be illogical to request recommendations regarding a dust control problem from a manufacturer of dry centrifugal collectors when the issue concerns metallurgical fume collection and help should be sought from that source.

If the above premise has merit, then a given dust collection problem should be evaluated either:

1. On the basis of known and recognized collector design for the particular problem, or
2. An evaluation of the dust characteristics, the carrier gas stream characteristics, and requirements of the dust control device.

In the latter case, the following comments could serve as a check list of information required and decisions to be made for a satisfactory solution to a specific dust collector application.

Dust Characteristics

Mean Particle Size and Range. Obviously, the coarser the particle and the narrower the range of sizes, the easier the removal and the less expensive the control equipment indicated. If all particles were of a stated size, collection would be higher with any dust collector when compared with a mean particle size with considerable quantities smaller and larger than stated. Deviation from the mean does describe this range, although it is helpful to learn that most dusts produced from industrial operations have a surprising consistency in the range of oversize and undersize from the mean.

Concentration. The heavier the dust loadings, the higher the collector efficiency that is required to reduce quantities discharged to the atmosphere to a reasonable degree. For a given exhaust volume, a collector with 50 per cent collection efficiency on a loading of one grain per cubic foot, will discharge with the cleaned air the same number of pounds as a device with 90 per cent collection with a loading of five grains. Such illustrations, however, have one major flaw too frequently overlooked in that the particles escaping the collector with 50 per cent control would be much larger and would settle more quickly in the immediate area than in the case of the more efficient collector operating on the same or the higher loading. This comment is the only drawback to the frequently heard advice to "evaluate the amount of material *escaping* the dust collector instead of the percentage caught".

Where air or gas density differs from standard air

which is 70F and 29.92 inches of mercury, reduction to these standard conditions will help in the evaluation.

Abrasive Characteristics. There is nothing more exasperating to a purchaser and more embarrassing to a supplier than the wearing through of a dust collector in a few months of service. Two general errors in evaluation account for many of such failures:

1. Failure to evaluate concentration, particle size, and particle shape. Of the three, particle size is the most frequent overlooked. Abrasion on collector surfaces per pound of material collected is a function of surface area of the particles. As surface area varies roughly as the cube, it is apparent that the surface area of a given weight of one micron particle will have roughly 1,000 times the surface of a similar weight of 10 micron particles. The same 1,000 factor applies between 10 microns and 100 microns. It is particle size more than concentration that explains the greatly increased abrasion from pulverized fuel fly ash as compared to fly ash from spreader stoker fired boilers; from rock crushers compared to metallic grinding with an abrasive wheel.
2. Where abrasion is anticipated, reduction in trouble is often attempted by trapping out a large portion of the dust load before reaching the exhauster or collector. Removal of 85 per cent of the dust load by such a primary device seldom more than doubles the equipment life on the downstream side. The reason has been explored in Item 1—the coarse particles with small surface area per pound are eliminated, but the fines with their extensive surface area still remain to rub against the metallic surfaces under discussion.

Evaluate abrasion possibilities whenever any organic dusts are involved. Grain hulls, tobacco leaf and stems cause surprising amounts of abrasion.

On the other hand, many a reported case of collector deterioration from premature wear is caused by poor collector design, installation, or operation. Under such cases, dust loadings may recycle within the collector causing wear the equivalent of many times the entering concentration.

Adhesive Characteristics. Some collectors are more critical than others to plugging caused by sticky, packing, or by hygroscopic characteristics of the materials. Collectors with small air passages, and collectors in the fabric group would be most susceptible to such problems. Dry centrifugals with small dust discharge ports will plug in outdoor locations during start up of dryers on cool mornings. Fabric arresters are questionable on foundry shakeout and sand conditioning systems due to moisture vapor load picked up by the exhaust air from the hot, moist sand.

In marginal instances, added costs of insulation or added source of heat may be necessary.

Bridging Characteristics. In many industrial dust control problems, bridging can cause plugging of collector passages and dust disposal devices. Physical dimensions of wood chips from woodworking can be greater than the passages provided for their removal or disposal; "onion skin" wood shavings and linty dusts can bridge between collector surfaces, dusts of low specific gravity or of wide range in particle size providing high degree of voids and low bulk weight can bridge over dust bin discharge openings. Bin vibrators will prevent bridging trouble in hoppers as long as no storage occurs in dust hopper. With many materials, bridging is accelerated by vibrators due to the packing action on partially full storage hoppers.

Fire or Explosion Hazard. Evaluation of safeguards is recommended where dust is from organic materials such as spices, grain, wood flour, cotton lint, chemicals such as sulphur, those used in the manufacture of plastics, magnesium, aluminum, and coal. The smaller the particle size, the greater the rate of flame propagation. Fortunately, concentrations in exhaust systems are usually below minimum explosive concentrations, and source of ignition improbable. The hazard is greatest where mechanical attrition occurs in the process or where dust loadings are very high as in pneumtaic conveying systems.

The biggest hazard from fire or explosion in dry type dust collectors is the welding rod or cutting torch used by maintenance and repair personnel.

Foreign Material. Certain types of industries appear unable to keep workmen from disposing of cleaning rags, lunch wrappers, cigarette packaging via the exhaust hoods provided for their comfort and protection. Such foreign material can play havoc with many types of dust collectors and dust disposal devices. Quantities are too great in most cases to make screening out of such material practical as screen plugging in turn can cause extreme reduction in exhaust volume.

Corrosive Gases. Corrosive gases are especially significant in wet collector designs and may necessitate expensive special materials of construction. Where gases of combustion are handled by wet collectors, corrosion possibilities should be carefully evaluated. Neutralizing of supply water is expensive and seldom a complete answer. Only a portion of such gases are scrubbed out by the water in the dust collector passages and corrosion is often the greatest problem on the damp surfaces of cleaned gas passages, exhauster, and also the discharge stack.

In less frequent cases, dry gases can cause attack on fabrics in collectors, or set up electrolytic attack on metallic parts.

Gas Stream Characteristics

Volume. The total cubic feet per minute of gas to be cleaned will influence collector selection in several respects.

1. Unit collectors could have application for small systems involving up to a few thousand cfm. They would seldom have place where large volumes are handled, as the equipment cost, floor space, number of servicing and dust disposal points would point in favor to one or more central systems.
2. Very large volumes from numerous dust producing points will often be broken into several smaller systems to provide greater flexibility and more readily accommodate exhaust system and dust collector relocation with changes in plant processes or layout.
3. Some dust collector efficiencies decrease with size which could rule out selection for large volumes. Geometrically, similar cyclones are measureably lower in efficiency when a cyclone is designed for 50,000 cfm compared to a similar design dimensioned for 5,000 cfm.

TABLE 1.—DUST COLLECTOR CHARACTERISTICS

Item	Cyclones	High Efficiency Centrifugals	Wet Collectors	Fabric Collectors	High Voltage Electrostatic
1. The Effect of Dust Variations					
Efficiency, particles less than 1 micron	Poor	Poor	Poor to Fair	Good	Good
1—10 microns	Poor	Poor to Fair	Fair to Good	Good	Good
10—20 microns	Poor	Good	Good	Good	Good
Over 20 microns	Fair to Good	Good	Good	Good	Good
Abrasion resistance	Fair	Fair	Good	Good	Fair
Ability to handle sticky, adhesive materials	Fair	Poor	Poor to Good	Poor	Poor
Bridging material gives troubles	Slight	Yes	No	Yes	Yes
Fire or explosion hazard minimized	Fair	Fair	Good	Poor	Poor
Can handle hygroscopic materials	Yes	Fair	Yes	With Care	With Care
Large foreign materials cause plugging	Seldom	Yes	Seldom to Yes	Seldom	Yes
2. The Effect of Gas Stream Variation					
Maximum temperature (F), standard construction	750	750	No Limit	180-275	750
Troubles from condensed or entrained mists of vapors	Slight	Considerable	Slight	Considerable	Some
Corrosive gases attack standard construction	Slight	Slight	Severe	Slight	Slight
3. The Collector					
Space	Large	Modest	Modest	Modest to Large	Large
Pressure drop	1"-2"	3"-5"	3"-6"	2"-6"	1"-2"
Reduced volume adversely affects collection efficiency	Yes	Yes with most designs	Depends on design	No	No

4. Cost can rule out some designs except under extreme circumstances. It will be rare that high voltage electrostatic will be used for volumes under 25,000 to 50,000 cfm. Cost of accessory electrical equipment makes cost per unit of volume very high where smaller volumes are involved. For volumes under 1,500 to 2,500 cfm, installed cost of wet collectors is high, with the need for water supply and drain connections.

Gas Temperature. Many collectors have temperature limitations beyond which they can be used only with special materials or expensive accessory equipment. Standard fabric arresters are not recommended with cotton filter media for more than 170 or 180F; with wool not over 200F. Even with expensive synthetic fabrics, 275F is the usual upper limit without elaborate gas cooling auxiliary equipment. Dry type mechanical collectors of standard steel construction are usually limited to 750F although stationary designs especially with cast metal parts are often found in service up to 900F.

Condensable Vapors. Presence of mists, steam, high water vapor content or other condensable vapors can make many collectors inoperative by "mudding" moist dust deposits on collector surfaces, thus restricting air flow.

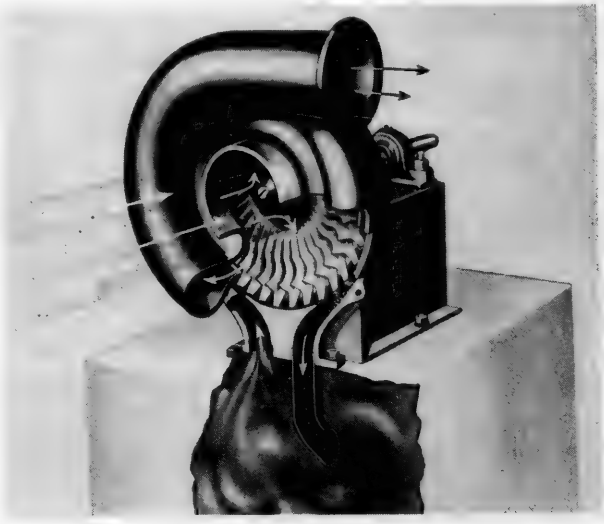
Collector Selection

An outline of dust collector characteristics is presented in Table 1. It shows usual relationships between the basic groups of collector designs although there can easily be exceptions where an individual design is appraised against such background material.

Evaluation of collector should include consideration of the following factors.

Collection Efficiency Required. Minimum acceptable performance will depend on plant location, dust concentration, particle size range, local meteorological problems, community or state regulations, the point of cleaned gas discharge. The larger the exhaust volume, the higher the efficiency usually required with the accompanying increased "mass rate of emission". Even in isolated areas, the parking lot for employees' automobiles can be a source of grievance and complaint from settled material on car finishes. It appears that a major portion of complaints from settled material comes from automobile owners rather than real estate owners.

For most applications, collection efficiency stated as a percentage removal by weight of the entering contaminant will be a sufficient gage of performance. Where particle size cannot be defined or measured, collection efficiency can be expressed by degree of removal in certain size fractions usually plus 325 mesh, 20-44 microns, 10-20 microns, 5-10 microns; sometimes 1 to 5 microns and less than 1 micron. (Checking of fractional size guarantees involves tedious expensive analysis of samples and answers will vary with the technique used.) Where



Dry type dynamic precipitator in the high efficiency collector range. American Air Filter Co.

TABLE 2.—USUAL AIR CLEANER SELECTIONS FOR INDUSTRIAL PROCESSES

Operation	Concentration	Particle Sizes	Collector Types Used in Industry					See Remark No.
			Cyclone	High Eff. Centrifugal	Wet Collector	Fabric Arrester	High Voltage Electrostatic	
CERAMICS								
Raw product handling	light	fine	rare	seldom	frequent	frequent	no	1
Fettling	light	fine to medium	rare	occasional	frequent	frequent	no	2
Refractory sizing	heavy	coarse	seldom	occasional	frequent	frequent	no	3
Glaze and vitr. enamel spray	moderate	medium	no	no	usual	occasional	no	
CHEMICALS								
Material handling	light to moderate	fine to medium	occasional	frequent	frequent	frequent	rare	4
Crushing, grinding	moderate to heavy	fine to coarse	often	frequent	frequent	frequent	no	5
Pneumatic conveying	very heavy	fine to coarse	usual	occasional	rare	usual	no	6
Roasters, kilns, coolers	heavy	medium to coarse	occasional	usual	usual	rare	often	7
COAL MINING AND POWER PLANT								
Material handling	moderate	medium	rare	occasional	frequent	frequent	no	8
Bunker ventilation	moderate	fine	occasional	frequent	occasional	frequent	no	9
Dedusting, air cleaning	heavy	medium to coarse	frequent	frequent	occasional	often	no	10
Drying	moderate	fine	rare	occasional	frequent	no	no	11
FLYASH								
Coal burning—	light	fine	no	rare	no	no	no	
chain grate stoker fired	moderate	fine to coarse	rare	usual	no	no	rare	12
pulverized fuel	heavy	fine	rare	frequent	no	no	frequent	13
Wood burning	varies	coarse	occasional	occasional	no	no	no	14
FOUNDRY								
Shakeout	light to moderate	fine	rare	rare	usual	rare	no	15
Sand handling	moderate	fine to medium	rare	rare	usual	rare	no	16
Tumbling mills	heavy	medium to coarse	no	no	frequent	frequent	no	17
Abrasive cleaning	moderate to heavy	fine to medium	no	occasional	frequent	frequent	no	18
GRAIN ELEVATOR, FLOUR AND FEED MILLS								
Grain handling	light	medium	usual	occasional	rare	frequent	no	19
Grain dryers	light	coarse	no	no	no	no	no	20
Flour dust	moderate	medium	usual	often	occasional	frequent	no	21
Feed mill	moderate	medium	usual	often	occasional	frequent	no	22
METAL MELTING								
Steel blast furnace	heavy	varied	frequent	rare	frequent	no	frequent	23
Steel open hearth	moderate	fine to coarse	no	no	doubtful	possible	probable	24
Steel electric furnace	light	fine	no	no	considerable	frequent	rare	25
Ferrous cupola	moderate	varied	rare	rare	frequent	occasional	occasional	26
Non-ferrous reverberatory	varied	fine	no	no	rare	?	?	27
Non-ferrous crucible	light	fine	no	no	rare	occasional	?	28
METAL MINING AND ROCK PRODUCTS								
Material handling	moderate	fine to medium	rare	occasional	usual	considerable	?	29
Dryers, kilns	moderate to heavy	medium to coarse	frequent	frequent	frequent	rare	occasional	30
Cement rock dryer	moderate	fine to medium	rare	frequent	occasional	no	occasional	31
Cement kiln	heavy	fine to medium	rare	frequent	rare	no	considerable	32
Cement grinding	moderate	fine	rare	rare	no	frequent	rare	33
Cement clinker cooler	moderate	coarse	occasional	occasional	?	?	?	34
METAL WORKING								
Production grinding, scratch brushing, abrasive cut off	light	coarse	frequent	frequent	considerable	considerable	no	35

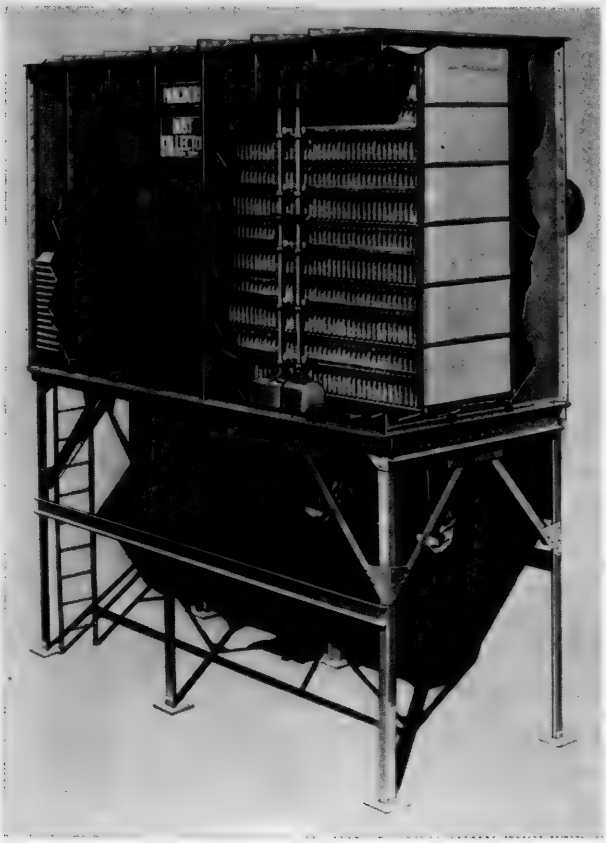
Operation	Concentration	Particle Sizes	Collector Types Used in Industry					See Remark No.
			Cyclone	High Eff. Centrifugal	Wet Collector	Fabric Arrester	High Voltage Electrostatic	
Portable and swing frame	light	medium	rare	frequent	frequent	considerable	no	
Buffing	light	varied	frequent	rare	frequent	rare	no	36
Tool room	light	fine	frequent	frequent	frequent	frequent	no	37
Cast iron machining	moderate	varied	rare	frequent	considerable	considerable	no	38
PHARMACEUTICAL AND FOOD PRODUCTS								
Mixers, grinders, weighing, blending, bagging, packaging	light	medium	rare	frequent	frequent	frequent	?	39
Coating pans	varied	fine to medium	rare	rare	frequent	frequent	no	40
PLASTICS								
Raw material processing	See comments under chemicals							41
Plastic finishing	light to moderate	varied	frequent	frequent	frequent	frequent	no	42
RUBBER PRODUCTS								
Mixers	moderate	fine	no	no	frequent	usual	no	43
Batchout rolls	light	fine	no	no	usual	frequent	no	44
Talc dusting and dedusting	moderate	medium	no	no	frequent	usual	no	45
Grinding	moderate	coarse	often	often	frequent	often	no	46
WOODWORKING								
Woodworking machines	moderate	varied	usual	occasional	rare	frequent	no	47
Sanding	moderate	fine	frequent	occasional	occasional	frequent	no	48
Waste conveying, hogs	heavy	varied	usual	rare	occasional	occasional	no	49

REMARKS

1. Dust released from bin filling, conveying, weighing, mixing, pressing, forming. Refractory products dry pan and screening operations more severe.
2. Operations found in vitreous enameling, wall and floor tile, pottery.
3. Grinding wheel or abrasive cut off operation. Dust abrasive.
4. Operations including conveying, elevating, mixing, screening, weighing, packaging. Category covers so many different materials that specific recommendation will vary widely.
5. Cyclone and high efficiency centrifugals often act as primary collectors followed by fabric or wet type.
6. Usual set up employs cyclone as product collector followed by fabric arrester for high overall collection efficiency.
7. Dust concentration determines need for dry centrifugal; plant location and product value, the need for final collectors. High temperatures are usual and corrosive gases not unusual.
8. Conveying, screening, crushing, unloading.
9. Remote from other dust producing points. Separate collector usual.
10. Heavy loading suggests final high efficiency collector for all except very remote locations.
11. Difficult problem but collectors will be used more frequently with air pollution emphasis.
12. Public nuisance from boiler blow down indicates collectors are needed.
13. Higher efficiency of electrostatic indicated for large installations especially in residential locations. Often used in conjunction with dry centrifugal.
14. Public nuisance from settled wood char gives indication that collectors are needed.
15. Hot gases and steam usually involved.
16. Steam from hot sand, adhesive clay bond involved.
17. Concentration very heavy at start of cycle.
18. Heaviest load from airless blasting due to higher cleaning speed. Abrasive shattering greater with sand than with grit or shot. Amounts removed greater with sand castings, less with forging scale removal, least when welding scale is removed.
19. Operations such as car unloading, conveyors, weighing, storing.
20. Collection equipment expensive but public nuisance complaints becoming more frequent.
21. In addition to grain handling, cleaning, rolls, sifters, purifiers, conveyors, storage, packaging operations are involved.
22. In addition to grain handling, bins, hammer mills, mixers, feeders, conveyors, bagging operations need control.
23. Primary dry trap and wet scrubbing usual. Electrostatic is added where maximum cleaning required.
24. Cleaning equipment seldom installed in past. Air pollution emphasis indicates collector use more frequently in future.
25. Where visible plume objectionable from air pollution standards, use of fabric arresters with greater frequency seems probable.
26. Most cupolas still have no collectors but air pollution and public nuisance emphasis is creating greater interest in control equipment.
27. Zinc oxide loading heavy during zinc additions. Stack temperatures high.
28. Zinc oxide plume can be troublesome in certain plant locations.
29. Crushing, screening, conveying, storage involved. Wet ores often introduce water vapor in exhaust air stream.
30. Dry centrifugals used as primary collectors, often followed by final cleaner.
31. Collection equipment installed primarily to prevent public nuisance.
32. Collectors usually permit savage of material and also reduce nuisance from settled dust in plant area.
33. Salvage value of collected material high. Same equipment used on raw grinding before calcining.
34. Coarse abrasive particles readily removed in primary collector types.
35. Roof discoloration, deposition on autos can occur with cyclones and less frequently with dry centrifugal. Heavy duty air filters sometimes used as final cleaners in such instances.
36. Linty particles and sticky buffing compounds can cause trouble in high efficiency centrifugals and fabric arresters. Fire hazard is also often present.
37. Unit collectors extensively used, especially for isolated machine tools.
38. Dust ranges from chips to fine floats including graphic carbon.
39. Materials involved vary widely. Collector selection may depend on salvage value, toxicity, sanitation yardsticks.
40. Controlled temperature and humidity of supply air to coating pans makes recirculation from coating pans desirable.
41. Manufacture of plastic compounds involve operations which are allied to many in chemical field and vary with the basic process employed.
42. Operations are similar to woodworking and collector selection involves similar considerations.
43. Concentration is heavy during feed operation. Carbon black and other fine additions make collection and dust-free disposal difficult.
44. Often no collection equipment is used where dispersion from exhaust stack is good and stack location favorable.
45. Salvage of collected material often dictates type of high efficiency collector employed.
46. Fire hazard from some operations must be considered.
47. Bulky material. Storage for collected material is considerable, bridging from splinters and chips can be a problem.
48. Production sanding produces heavy concentration of particles too fine to be effectively caught by cyclones or dry centrifugals.
49. Primary collector invariably indicated with concentration and partical size range involved. Wet or fabric collectors when used are employed as final collectors.

cleaned air is recirculated to occupied space, air cleanliness in number of particles by count per cubic foot of air is most significant. Where air pollution control (as opposed to public nuisance elimination from settled coarser materials) requires high degree of sub micron removal visible standards (usually expressed vaguely in degrees of opacity) may be necessary although there is no known correlation between visible appearance and a concrete measurement in terms by weight.

An excellent guide is the selection of equipment with



Phantom view of a Pangborn type CH cloth screen dust collector.

the highest order of contaminant removal available at reasonable installed cost, operating and maintenance cost. Looking into the future, standards of acceptable air cleanliness appears likely to become more stringent in many parts of the United States.

Types Available. A review of the problem against the dust and gas stream characteristics and a decision on degree of cleaning required will eliminate certain types of equipment from consideration and permit more careful evaluation of the remaining possibilities. Table 2 may be of assistance at this phase of a collector selection procedure.

Indoor or Outdoor Collector Location. Space required and space available will determine collector location. Outdoor locations suffer greatly from neglect, and may require protection against freezing or condensation. During cold or rainy weather and during night time operation, there are few workmen who will follow prescribed schedules of inspection, servicing and preventative maintenance, where the collector is in an exposed outdoor location.

Installation Work Required. Amount and cost of installation work is an extreme variable with different designs. Such costs can outweigh and make unattractive a product whose F.O.B. factory price might be substantially below that of other designs.

Provisions for Material Salvage or Disposal. Decisions on disposal of collected material must be a part of initial collector discussions as collector location, use of wet or dry devices, storage capacities, selection of material handling equipment will be important factors in type and arrangement of collector best suited for a particular problem.

Provisions for Maintenance. Any dust collector will require some attention. Generally, the higher the order of cleaning, the more routine inspection and servicing is required. Be certain that access platforms and permanent ladders are provided to encourage the attention needed and also to provide maximum safety for the personnel.

It is good practice to study collector installation, operation, and maintenance instructions before purchase of a collector design rather than after collector is delivered.

Need for Makeup Air Supply. If total volume exhausted from room or building exceeds two air changes per hour, give serious consideration to makeup air supply. Heating costs will be less, cold drafts reduced, and exhaust systems will function as planned. Well located makeup air discharges can increase exhaust system effectiveness in providing controlled air flow toward all dust producing areas.

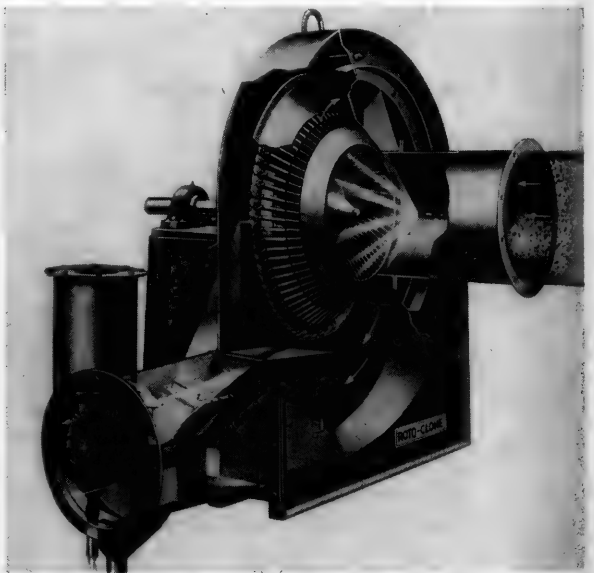
Installation, Operating and Maintenance Costs. No comparative evaluation of collectors is complete without an appraisal of these items. Collector purchase price is often a small portion of total cost. Consider and include erection, supervision, foundations, wiring, plumbing, disposal equipment and accessory equipment not included with collector proposal before making final selection of collector type or design.

Present Practice

In Table 2, an effort has been made to report types of dust collectors encountered for a wide range of industrial processes. While many of the ratings are purely arbitrary and are a matter of personal opinion, they may serve as a check against conclusions reached by analysis of the factors outlined in this discussion.

Acknowledgment

This article is based on notes for a discussion presented at the Industrial Ventilation Conference held at Michigan State College.



High efficiency wet collector of the dynamic type—American Air Filter Co.

A large rug serves as a neutral sitting surface for these kindergarten students at North School in Glencoe, Illinois.

How to Keep a School Floor Warm

WILLIAM POTTER

Herman Nelson Unit Ventilator Products, American Air Filter Co., Inc.

Peripheral insulation and low-conductance floor covering are proposed as simple means of making school floors feel warm enough—even for sprawling tots.

IN recent years, school architects and heating engineers have become increasingly aware of demands by elementary school teachers for floor surfaces that feel neutral or slightly warm to the touch. Cold floors can be a serious problem in a school, especially in a kindergarten where the floor is in constant use.

A common solution to the problem has been to imbed hot water coils in the concrete floors of such rooms. In many cases the thinking behind this solution has been to heat the floor only to a temperature that feels comfortable, and let a separate heating and ventilating system take care of the remaining room heating and ventilating requirements. Where most of the load is carried by floor coils, a common comment from teachers is that classrooms become chronically overheated, especially in mild weather.

This overheating has resulted because classrooms and kindergartens require cooling a large percentage of the time, even when outdoor air temperatures drop as low as 10 to 15 F. Amazing as this may seem to some, the body heat given off by pupils, heat from lights, and the tremendous solar heat gains through large expanses of glass very often compensate for, and sometimes surpass, the total heat loss from a classroom. At such times the ventilating system actually introduces cool outdoor air to keep room temperature down to 72F.

While the room is being cooled, however, a heated floor slab will send large quantities of heat into the room in order to maintain that neutral or slightly warm feeling in the floor surface. If sufficient cool ventilating air is available, the room will not overheat. Very often, however, all the sources of heat gain, including the floor, combine to overpower the ventilating system. As a result the unfortunate pupils are forced to carry on drowsily in an overheated room. If heat in the imbedded coils is turned off to allay this overheating, then the floor surface feels cool to the pupils' touch, and the purpose of the coils is defeated.

The coils could remain on, of course, and additional ventilating air cooling capacity installed to keep classroom air down to 72F. But this in effect results in a cooling system battling a heating system. Economically such a conflict is impossible to justify.

Since a comfortable-feeling floor surface is the goal, there is fortunately another approach to the problem.

Recent laboratory research has proved that at ordinary room air temperature linoleum, asphalt tile, rubber tile, or vinyl floor tile feel neutral or slightly warm to the touch only when their surfaces are warmed to almost 80F surface temperature. This is verified by the normal surface operating temperatures of imbedded coil installations.

It has also been established, however, that cork tile and other insulating floor coverings feel neutral or slightly warm at only 70 to 72F surface temperature. In other words, because these types of flooring have a high insulative value, they give the same sensation of warmth at surface temperatures of 70 to 72F that conductive floor coverings give at 78 to 80F.

This difference in the apparent temperatures of various surfaces is something we experience almost every day. When we first sit in a metal lawn chair, for instance, it feels cold. Yet a wooden chair on the same lawn gives no such chilling effect. Likewise a floor covered with linoleum, asphalt, vinyl or rubber tile will give a chilling sensation, while a cork-covered floor would be similar to wood in its feel. It is purely a matter of conductance value of the floor tile that makes it seem warmer or colder. However, that fact alone would be of little concern to the architect or engineer except for one additional test finding.

Extensive field tests in many school buildings during the cold winter months indicate that unheated floors with adequate peripheral insulation assume a natural surface temperature of about 68 to 72F. Such floors, if covered with insulative flooring material, feel just as comfortable to the touch as do floors covered with highly conductive flooring materials heated to 78 to 80F surface temperature.

A member of the sample-testing group records her warmth sensation to various types of floor covering materials at varying temperatures.

Thus, it is possible to maintain comfort simply by the use of carpeting, wood, cork, or other insulative type floor coverings in kindergartens, classrooms, and playrooms where body contact with the floor surface is common.

Air Conditioning for Lincoln's Tomb

One of the most famous and beautiful of our national shrines—the tomb of Abraham Lincoln, in Springfield, Ill.—has been furnished with air conditioning, for the benefit of the thousands of visitors who enter its doors every year to pay homage to the memory of the great man. It is one of the first of our national shrines to be air conditioned.

This unusual installation entailed a number of difficulties not ordinarily found in the installation of air conditioning equipment. Most important was the strict necessity of maintaining the architectural integrity of the structure. Also, the work had to be accomplished without interfering with regularly conducted tours.

A small, roughly rectangular granite structure, Lincoln's Tomb offered very limited space for the placement of air conditioning equipment. The three major areas to be air conditioned were the Sarcophagus Chamber and the Crypt Room, situated at the north end of the structure, and the Rotunda through which the public enters, situated at the south end. The areas are connected by an open marble hallway running entirely around the interior portion of the tomb.

Three Typhoon packaged air conditioning units were used in this installation. To condition the north end of the tomb, two 2-hp units were installed behind the marble partitions which separate the hallway from the interior portion, at a point approximately halfway between the north and south ends. Four large supporting columns occupy the interior portion, and therefore the units had to be placed in the narrow passageways between those columns and the partitions. Ducts were run from each unit toward the rear of the building in a concealed false ceiling, to ceiling diffusers located in the Sarcophagus Chamber and in the hallway adjacent to the Chamber.

The third air conditioner, a 3-hp Typhoon unit, was placed in the south portion of the tomb, near the Rotunda. Ducts were run around the Rotunda to existing supply grilles previously used for a simple ventilating system.

The marble hallway connecting the air conditioned areas is cooled by return air. Return air openings from the previous system were already present in the walls, and existing fresh air intakes in the interior portion were also employed. Thus the installation was accomplished without affecting the architecture in any manner.

A sign of the increasing interest in air conditioning, this installation reflects the spread of comfort cooling into non-commercial areas where such improvements are somewhat exceptional. It is also a striking example of how well the flexibility and compactness of packaged units can serve in installations where it is important to avoid interfering with normal operations or architectural structure.

Wide Area, Low Velocity Air Diffusion

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The air distribution function in comfort or process cooling revolves about the problem of getting enough conditioned air into a room to absorb the heat and moisture load without creating unpleasant sensations of draft, stagnation, or excessive temperature variations in the room. This article develops principles based on laboratory and field observations of arrangements for introducing air through wide perforated areas at low injection velocity.

AIR distribution is an important function because it largely determines the effectiveness of the air conditioning system. It is the means of contact between the air conditioning system and the customer; a human being, a process, or a machine.

Air distribution devices fall into two broad catagories:

(1) High injection velocity types such as modified nozzle types of ceiling diffusers, and side-wall grilles.

(2) Low injection velocity types utilizing isolated, separately controlled, perforated ceiling panels and also various other ceiling structures which afford wide dispersion of small openings. This discussion will center on the isolated panel types since they have been extensively tested and lend themselves more readily to general analysis. The principles developed can be carefully applied to analysis of other wide dispersion types in order to anticipate their performance.

There has been a growing interest in the use of low injection velocity because of the difficulty in handling large air volume rates required in spaces having high heat loads. The perforated panel has been successful because of the rapid, intimate mixing which it makes possible. Following is a consideration of the physics of this mixing.

Physics of Entrainment

To understand the characteristics of a perforated distribution plate, it is necessary to study first the behavior of a single jet of cold air coming through one perforation uninfluenced by any adjoining jets. While it is to be understood that the various phenomena to be described take place simultaneously and continuously, nevertheless, it is desirable for the purposes of this analysis to treat them independently.

A jet of cold air issues through the perforation and drives into the warm air adjoining the panel. As it pushes downward, the viscous forces of both the room and supply air come into play (Fig. 1). A resistance to the motion of the jet is set up along the sides of the supply air jet, subjecting it as well as the surrounding warm air to shear stresses. The adjoining layers of warm and cold

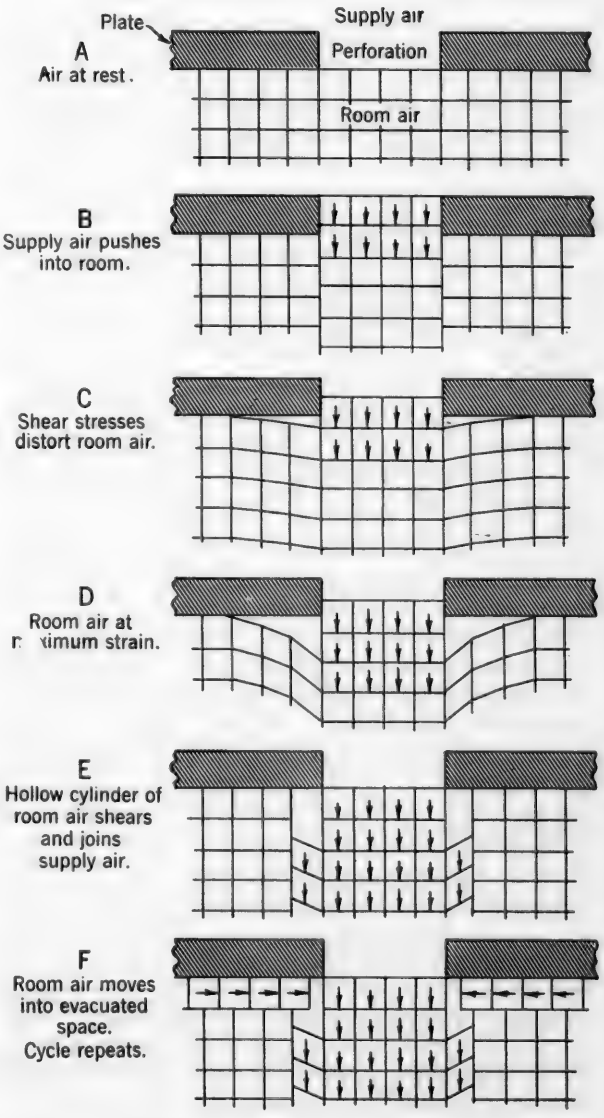


Fig. 1. Physics of secondary air motion in a single jet.

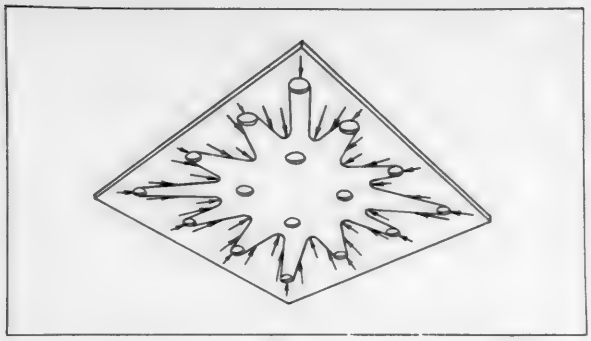


Fig. 2. Secondary flow pattern of a perforated area.

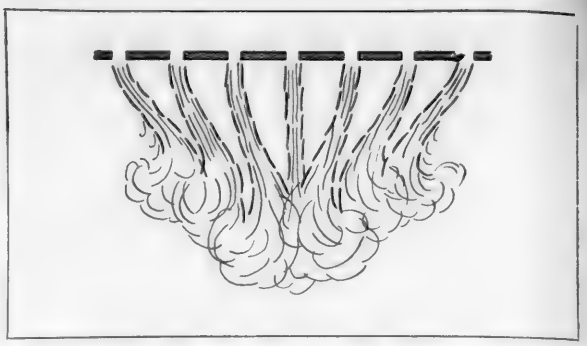


Fig. 3. Converging flow of jets issuing from a perforated area.

air begin to distort under this stress, until the air which has the lowest shear resistance, parts from the parent body and becomes identified with the air having the higher viscosity. Since the viscosity of warm air is lower than that of the cold air entering the room, it is a layer of warm air which shears, and the jet proceeds downward as a slightly enlarged mass.

The removal of the hollow cylinder of warm air, which has been pulled along by the cold supply air, leaves a low pressure area in the vicinity of the perforation through which the next segment of cold air is moving. Static pressure forces room air into the evacuated space bringing another unit of warm air into contact with the jet of cold air, subjecting it, in turn, to the previously described viscous forces. The warm air moves along the most direct path. In most cases, this will be a straight line directed toward the orifice and parallel to and just below the plane of the orifice plate. (Fig. 1F.) This motion of room air is referred to as secondary air motion or entrainment, and is the operating principle of all air entrainment or induction devices.

Jet velocity and temperature differential between supply and room air determine the ultimate effect of the viscous forces. For example, when supply air is warmer than room air, an entirely different pattern results. The entering warm air has the lower viscosity, hence, the lower resistance to shear. As a result it loses its outer layers as it penetrates into the cool air of the room. This builds up pressure around the orifice and causes air to flow away from the orifice along the lower face of the oriface plate.

A single row of perforations exhibits characteristics which are similar to those of the single jet, because the relatively warm room air is still readily accessible to the viscosity influences of the cold air entering through the perforations.

Perforated Area

A fully perforated area consisting of a number of rows of perforations exhibits markedly different characteristics. (Fig. 2.) As before, the initial action of the cold air jets results in the partial evacuation of warm air from the vicinity of the perforations. Static pressure forces room air in toward all sides of the perforated area. The path across the perforated area, however, is tortuous, producing a static pressure gradient from the area boundary to its geometric center. This pressure gradient gently deflects the various jets toward an imaginary vertical line projecting downward from the geometric center of the perforated area, producing the net effect of convergent flow. (Fig. 3.) Room air mixes with supply air at a boundary which approximates the perimeter of the perforated area.

In light of the foregoing, it can be seen that the function of a panel is served best when the perforated area has the greatest perimeter possible. Under the same conditions, the panel with the highest aspect ratio will produce the best air diffusion. Tests indicate that the panel performance improves markedly from an aspect ratio of 1 up to an aspect ratio of 4, with an insignificant rate of improvement beyond that ratio.

Influence of Walls

From the converging effect of separate jets issuing through a perforated plate, additional inferences can be drawn regarding the influence of the boundary planes of the space on panel performance. Consider the case of a vertical wall adjacent to the side of the perforated ceiling area. Free of the influence of this wall, the jets would converge gently toward the projected geometric center of the perforated area. With the wall in place, (Fig. 4), room static pressure can be exerted only along the unobstructed sides, and jets will be deflected toward the wall concentrating the flow of air downward along it.

Applying the same principles, one can see that a wall which *bisects* a panel *will not* affect the flow pattern, since all parts of the perforated area perimeter are acted upon uniformly by the room static pressure. If, however, the wall is located off the centerlines of the perforated plate, an unsymmetrical pressure gradient will develop, resulting in the greatest jet deflection under the larger portion of the panel and, hence, in downward flow concentrated

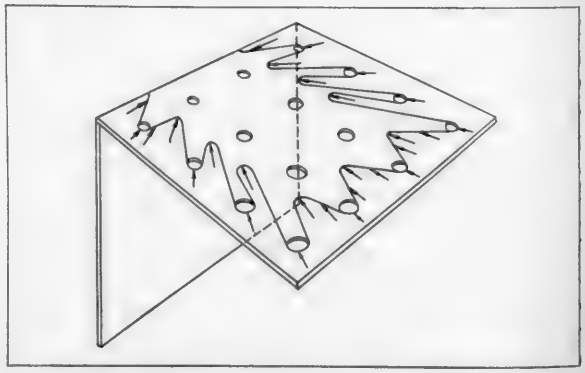


Fig. 4. Flow pattern in perforated area near vertical wall.

along that side of the wall. Intersecting low partitions may be ignored if they extend no further than up to within approximately one panel width of the perforated plate.

Flow Patterns

Air diffusion is said to be satisfactory when, under full load conditions, temperature variations within the critical zone can be held to less than X deg F without excessive air motion. Where the ultimate objective of the air conditioning system is a device or a process, X is the widest allowable room temperature fluctuation. In comfort air conditioning, X is that temperature differential which can escape subjective detection by an average human being under normal circumstances. It is generally regarded as being about 3 deg F. The critical zone encompasses the space immediately surrounding the ultimate objective of the air conditioning system.

Evaluation of an air diffuser, therefore, depends on a knowledge of the air temperature and velocity profiles it generates under a given set of conditions. These can be obtained by traversing the area served by the diffuser with temperature and velocity sensing elements, recording the values on suitable drawings which represent sections of the subject space, and in the case of the temperature traverse, constructing lines through points of equal temperature to develop a famliy of isothermal curves. Temperature distribution is satisfactory when the isothermal curve for the temperature (T_{room}—X) does not extend into the critical zone. The total distribution is satisfactory if under the above conditions the air velocity in the critical zone is not excessive.

The variables which determine air distribution pattern under a panel are so many and complex that an empirical approach to the problem is the only practical one. This has been done and the conclusions which follow were developed from an analysis of experimental data.

The air flow pattern shown in Fig. 5 is typical of perforated panel cooling cycle performance. Isotherms originate at the boundaries of the panel and attain greatest room penetration along the vertical projection of the panel centerline. The air velocity does not drop off much below the minimium of the (T_{room}—X) isotherm. (Fig. 6.) The velocity at that point holds for successive points vertically down over a distance equal to or greater than most ceiling heights likely to be encountered in the average design job. Hence, even though temperature distribution suggests the possibility of capacity increase with ceiling height, air velocity, the limiting factor, is independent of ceiling height; so therefore, must panel capacity be also.

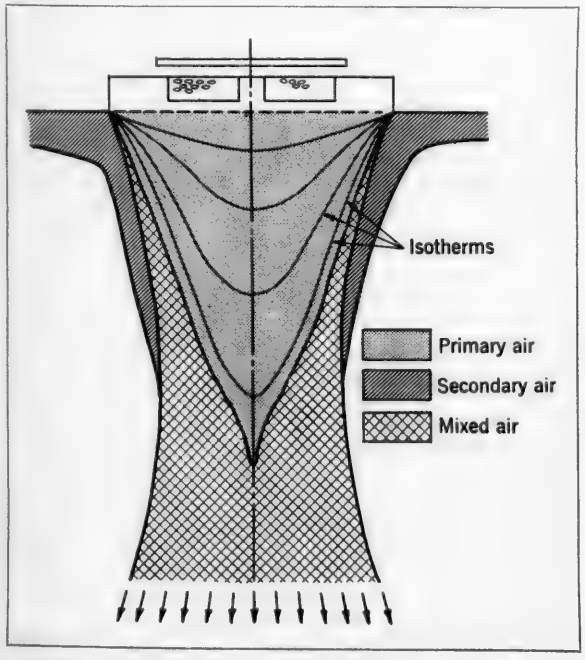


Fig. 5. Typical mixing and isothermal pattern under perforated area.

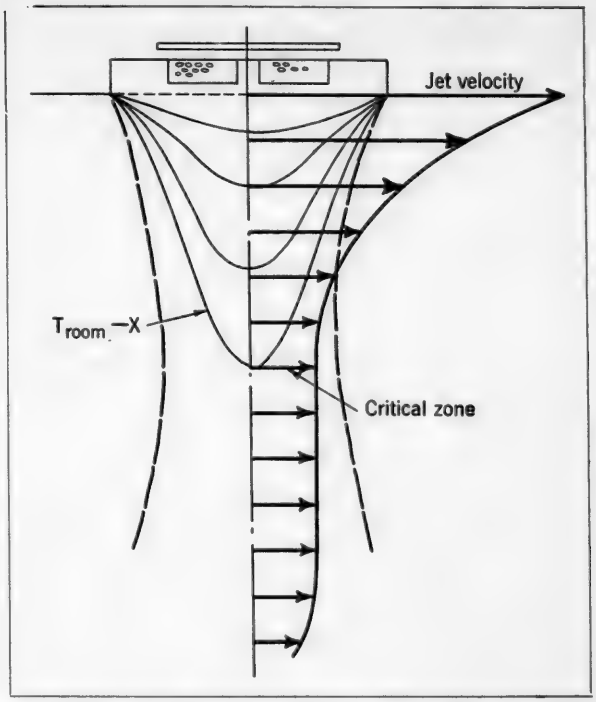


Fig. 6. Velocity distribution at projected centerline of perforated panel. Zone of relatively constant velocity occurs below isotherm of (T_{room}—X).

It is a characteristic of the isothermal curves that they are geometrically similar to those developed by panels of other widths operating under similar conditions. If, for example, a given panel delivering a certain number of cfm per square foot at a given temperature differential developes an isothermal curve with a penetration of 3 ft, the corresponding isothermal of a panel of one-half the width operating under the same conditions will have a penetration of only 1½ feet.

Spacing

When the balancing influence of adjacent walls is absent, perforated areas should not be brought closer to each other than one panel width without compromising advantages gained from high aspect ratios of the individual perforated areas. Two panels placed closely together will have the characteristics of one large area of greater width and correspondingly lower aspect ratio. (Fig. 7.) However, if two or more panels or runs of panels are separated from each other by a distance less than one panel width, the advantages of high aspect

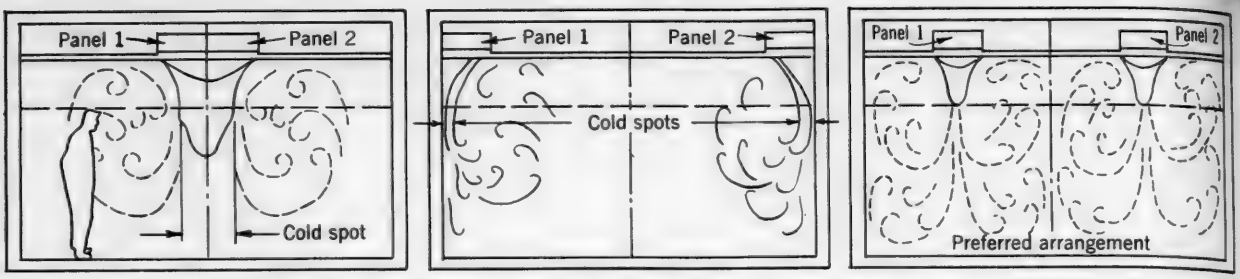


Fig. 7. Arrangements of two perforated panels in a long, narrow room.

ratio can be attained by designing to utilize the influence of walls to modify the application of the room static pressure against the issuing air streams.

Consider two runs of panels extending parallel to the longitudinal axis of a long narrow room. If the runs are placed side by side, the net effect is that of a panel twice the width of one of the runs. The $(T_{room}—X)$ isothermal of the combination will have double the penetration developed by the corresponding isothermal for either run separately with attendant temperature variations in excess of the range permissible within the critical zone. If, on the other hand, each run is placed against the side wall closest to it, the room static will deflect the jets toward their respective walls producing undesirable concentrations of air streams along these walls.

At some intermediate position between the above extremes, the interaction of the panels and walls balances the effect of the room static pressure to produce the desired independent action of each run. This condition is usually satisfied when the distance from the centerlines of the panel runs to their respective walls is equal to the spacing between the room centerline and the panel runs.

Control of Air to Perforated Areas

The delivery of air to specific perforated areas in a ceiling is relatively simple. A suitable plenum is erected over each area connecting to the supply duct through an air volume adjusting means. The plenum must be designed to provide a reasonably uniform distribution of air over the back side of the perforated plate. This could be done by a gradual transition from the supply duct enlarging to the dimensions of the perforated area or by recourse to a relatively deep plenum which would allow for development of uniform flow thru the perforations. In commercial practice, space is conserved by combining the volume regulating means with a suitable baffle set-up which permits substantially the same effect with a much shallower plenum.

The uniform delivery of supply air to a ceiling structure which of itself provides openings for diffusion of air into the room is more difficult since it is impractical to provide a separate supply to each of the openings and, moreover, it is very difficult to seal the plenum formed by the suspended ceiling sufficiently to provide uniform delivery without additional devices above it. Consider the following:

Air discharging from an open duct into a relatively large space will form a jet and produce a secondary air entrainment effect. This effect varies considerably with the cross-sectional area of the outlet as well as the velocity of the primary stream and the temperature difference between the primary and secondary air. When the duct is led into a relatively deep plenum, the entrainment effect persists, although the dimensions of the plenum can be such that there will be no particular effect on discharge through outlets in the bottom surface of the plenum. On the other hand, when the duct feeds through the side wall of a relatively shallow plenum chamber, that same secondary air entrainment effect reduces the pressure in the vicinity of the duct sufficiently to cause reverse flow through outlets if their resistance is relatively low. This is illustrated by Fig. 8.

Effect of Outlet Resistance

As has been indicated, the resistance of outlets in the plenum chamber is quite important and should be great enough to afford controlability of flow. For an air delivery of 25 cfm per sq ft of porous material, for example, the actual static pressure required across a perforated plate alone is on the order of 0.001 inch w.g. On the other hand, the same air delivery through a panel which includes both a perforated plate and an air valve may be on the order of 0.240 inch.

Other tests have indicated that velocities of 1,000 fpm through a duct over an orifice in the duct bottom can cause induction pressures across the orifice on the order of 0.010 inch. Obviously, then, if the same negative pressure occurs across a porous panel in the vicinity of the supply duct to a plenum designed for a plenum pressure of 0.001 inch w.g., the net reverse pressure tending to pull air into the plenum will be equivalent to 0.009 inch w.g. If, on the other hand, the plenum static pressure is held to the order of 0.240 inch, the net pressure will be 0.230 inch positive.

The magnitude of this induction pressure will vary

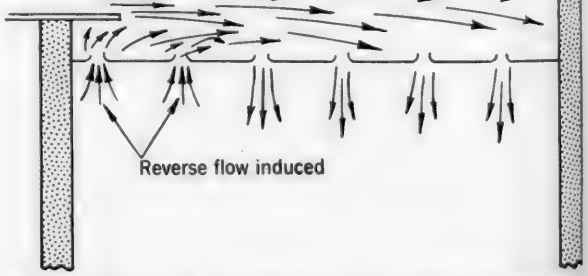


Fig. 8. Reverse flow induced through perforated ceiling by entrainment effect of air entering plenum.

indefinitely with the special conditions that may exist because of the infinite variety of plenum arrangements that are possible. With adequate flow control arrangements, satisfactory operation will result if entrance velocity does not exceed 100 fpm. The maximum velocity to be allowed in a supply duct feeding a plenum having only a porous bottom cannot be given since the positive pressure required is usually so small that it could easily be affected by even the slightest velocity.

Other difficulties also arise in connection with distribution through porous ceilings covering large areas. Where a common plenum chamber is used to cover a number of small spaces, it is practically impossible to vary the air delivery rate to the various spaces to meet the needs of the occupants and/or absorb the heat gains of the space. The plenum chamber is limited in size because it must be at least divided into so many separate air-tight chambers, each with individual supply systems, as there are separate zones in the systems. If the plenum is unusually restricted, as for example, if the plenum is shallow, or if it is extremely long as in the case of a plenum over a corridor, pressure build-ups will render balancing difficult. Actually, under such a circumstance the plenum must more nearly be considered as a duct since appreciable air flow friction losses can occur.

In addition, one must consider the fact that if the entire plenum is kept cold, the heat exchange between the plenum and the opposite sides of the bounding planes is increased. This is not particularly serious if the ceiling of the plenum forms the floor of an air conditioned space above. If, however, the ceiling of the plenum happens to be the inside surface of the roof structure, this factor must be accounted for in computing conduction gains or losses.

Summary

In the final analysis, it can be said that the use of low velocity injection air distribution provides a good many advantages in the modern air conditioning plant. Low velocity injection minimizes accumulation of the dirt carried by secondary air, provides a wide dispersion of the supply air, and is generally homogenous with the ceiling. Partitions can generally be moved with no difficulty. The determination of whether perforated panels or other types of porous ceiling should be used depends on the function which the designer needs to accomplish. Careful zone control, the need to minimize conduction gains, the cost of sealed plenums and desirability of providing for variations in air supply to meet needs of the occupants, press in favor of isolated perforated areas each independently controlable.

Air Conditioning Multiplies Office Space

A new approach to increasing available office building space through application of air conditioning has been reported by officials of the State-wide Wachovia Bank and Trust Co., largest banking institution between Washington and Atlanta. It was possible to add 29% to the available floor space in their 44-year-old, 8-story, home office building in Winston-Salem, N. C., by installing complete air conditioning to dispense with the need for earlier architectural methods of providing ventilation.

Bank officials had considered it necessary either to enlarge and modernize the present building, or to construct a new one. It was decided that by installing air conditioning to insure comfort, the two-story-high main banking area on the ground level could be cut horizontally adding an entire new floor. Additional space has been gained by constructing floors at every level across a conventional light and ventilation court running from the second through the eighth story. The gain amounts to about 1,000 square feet per floor.

As originally designed, the two-story-high ceiling in the extensively used banking area and the air shaft had permitted some alleviation of discomfort through ventilation and the fact that the warmest air would rise to the ceiling of the banking area. However, temperature and humidity inside the building in summer still depended to a large degree on conditions of the outside atmosphere.

As a result of a novel approach to the installation as designed by P. L. Davidson, consulting engineer of Greensboro, N. C. and Philadelphia, Pa., the air conditioning and refrigeration equipment takes up none of the reclaimed space, it is reported. A Carrier centrifugal refrigeration machine located in the modernized boiler room in the basement of the bank building provides cooling capacity equivalent to 220 tons of ice melting daily. An equipment tower for central air conditioning equipment has been constructed up the outside of the building in a set-back area no longer required for natural ventilation now that the building is air conditioned.

Central system air conditioning units using chilled water from the centrifugal will be located one to a floor in the tower, with each unit serving its entire floor of the building. The system will supply filter-cleaned air cooled and dehumidified in summer and heated in winter.

The Wachovia Bank is the first large building in Winston-Salem to be completely air conditioned. It is representative of an increasing number of contracts received by Carrier for air conditioning of business structures of moderate size which can provide first-class office space. Virtually all new big buildings constructed since the end of World War II have included complete air conditioning. Last year, the number of contracts for older buildings equalled purchases of systems for new ones. This trend is affecting not only the very large and widely-known multi-story structures, such as the Irving Trust Company in New York, but the smaller ones as well.

Other improvements provided in the modernization program celebrating the North Carolina Bank's 75th anniversary include installation of new transformers to handle the increased electrical load, modern lighting and an oil-fired steam generator replacing a stoker-fed boiler.

Air Conditioning Corporation of Greensboro, N. C. and Winston-Salem, N. C. is Mechanical Contractor, and Frank L. Blum is general contractor.

Equipment Selection Forms

for Heating, Ventilating and Air Conditioning Design – Part 2

JOHN W. HABJAN

A number of suggested equipment selection forms are presented to convey to the contractor the type of equipment required so that misunderstandings and costly errors may be avoided.

THIS article is intended mainly to focus added attention to the equipment selection phase of design and to suggest a streamlined selection procedure for engineers who choose mechanical apparatus for commercial heating, ventilating and air conditioning systems.

As mentioned in the previous article (H & V, Sept. 1954), these forms are only suggestive in nature and are expected to be modified by individual readers to suit individual engineering requirements. The contents of these forms are rather self-explanatory, and but for a few general remarks concerning the selection of individual pieces of equipment, no lengthy elaborations are believed needed.

For instance, the method for selecting a pump for a piping system should be very similar to that used in choosing a fan for a duct system covered in the previous article. A single-line sketch should be drawn to scale on black and white prints of the building floor plans to indicate all items and their locations, such as valves, fittings, pipe sizes and flow in gallons per minute, equipment, and static heads due to differences of liquid elevation. Information gathered from this diagrammatic sketch should then be filled in on the pump selection form and the machine chosen according to the static head calculated and other operating characteristics.

This form can be used to select any type of pump which may have to be used in conjunction with any one of the following heating, ventilating and air conditioning systems: chilled water, condensing water, well water, hot water, condensate return, and fuel oil.

Sometimes the selection of a piece of mechanical equipment is affected by the size of the room in which it will be located. For example, consider a boiler. The capacity of a heating plant is determined by the heat loss calculations, but its size is dependent upon its particular make. Different make boilers of the same capacity will have different physical dimensions. If the boiler room size is set, then the make of the boiler chosen must be such to suit the space. If the boiler room dimensions have not been established, then the engineer has more freedom in the selection of his boiler. Engineers should keep in mind that new boilers for existing buildings should be chosen also for their ability to be installed without the necessity of tearing down building walls, partitions, and relocating existing equipment in the process.

Thus a new boiler for an old building may have to

SUGGESTED EQUIPMENT SELECTION FORM FOR PUMP

Project No. _____ Date _____
Building _____ Selected by _____
System* _____ Checked by _____
Pump No.* P- _____ Pump location* _____

Item	Location of Item	GPM	Dia IPS	Equivalent Length, Ft	Friction, Ft/100Ft	Pressure Drop, Ft
Piping						
Fittings						
Equipment						
Static head						
Suction head						

Net pressure required at pump
Add ( )% safety factor
Gross total pressure required at pump
Nominal pump pressure to be selected
Equipment vendor selected for design purposes _____
Model No. _____; type*: _____
Capacity*: _____ gpm; _____ sq ft EDR
Discharge pressure*: _____ft; _____ psi
Suction pressure*: _____ft; _____ psi
Water temp. range to be expected*: _____° to _____°F
Pump rpm*: _____; bhp* _____; type drive conn.* _____
Type drive*: electric motor _____; steam turbine _____; air turbine _____
Press. at turbine inlet* _____psi; turbine rpm* _____
Motor rpm*: _____; hp* _____; type* _____; voltage _____; phase_____
Floor space required: L_____ inches x W_____ inches x H_____ inches; type base*: _____
Size of pump inlet: _____ips; pump discharge _____ips; vents _____ips; drain _____ips
Height of pump inlet above floor*: _____ inches
Type of automatic controls connected to pump starter_____

Type motor starter: _____; starter interlocked with _____
Equipment vendor (equal) _____; Model No. _____
Equipment vendor (equal) _____; Model No. _____

SUGGESTED EQUIPMENT SELECTION FORM FOR BOILER, OIL BURNER AND COMBUSTION CHAMBER

Project No. ———— Date ————
Building ———— Selected by ————
Boiler No. B-* ———— Checked by ————

Summary of heating loads from heat loss calculations:
Transm. and infilt. load ————Btu/hr
Outside air load ————
Hot water heat. load ————
Other heat. loads ————
Net load (present) ————
Future heat. loads ————
Net load (future) ————
Piping losses ( )% ————
Design load ————
( )% Pickup factor ————
Gross load ————Btu/hr; EDR——sq ft
Boiler gross I-B-R output selected*: ——Btu/hr; EDR——sq ft

Equipment vendor selected for design purposes ————
Model No.: ————; No. required*: ————; type*: ————
Height of waterline above water leg*: ————inches
Steam tap*: ————inches; return tap*: ————inches; surface blowoff: ————inches ips
Equalizing line: ————inches; blowdown: ————inches ips; length of tubes: ————inches
Overall dimensions: L—— inches x W—— inches x H—— inches
Breeching size diameter for one boiler: ————inches; for two boilers: ————inches
Chimney size diameter for one boiler: ————inches; for two boilers: ————inches
Smoke pipe connection: ————inches; combustion air intake: H————inches x W————inches
Chimney height for one boiler: ————inches; for two boilers: ————inches
Chimney height selected: ————inches; induced draft fan required: ————
Normal oil consumption per boiler*: ————gph
Boiler operating pressure*: from ———— to ———— psi; high limit setting ———— psi
Hot water temperature setting: ———— °F
Equipment vendor (equal) ———— Model No. ————
Equipment vendor (equal) ———— Model No. ————

Oil burner No. OB-* ————

$$\text{Oil burner capacity} = \frac{(\quad)\% \times \text{boiler gross I-B-R output}}{100\%}$$

= ————sq ft EDR

Equipment vendor selected for design purposes ————
Model No.: ————; No. required*: ————; type*: ————
Capacity range*: from ———— to ———— sq ft EDR (steam)
Oil consumption range*: from ———— to ———— gph
No. fuel oil*: ————; preheater required ————; gas conn. required ————
Type ignition required*: ————; type operation*: ————
Motor: hp* ————; rpm* ————; type ————; voltage——; phase ————
Separate pump required: ——; suction line ———— inches ips; return line ———— inches ips
Vent line ———— inches ips; full line ———— inches ips; telltale line ———— inches ips
Oil storage tank capacity —— gal; dia. —— ft, —— inches; length ———— ft, ———— inches
Type of motor starter ————; motor starter to be interlocked with ————
Type of automatic controls to be connected to motor starter ————

Equipment vendor (equal) ———— Model No. ————
Equipment vendor (equal) ———— Model No. ————
Combustion chamber dimensions (as required for ———— oil burner)
Inside dimensions: H————inches x L————inches x W—— inches
Distance from centerline of oil burner to floor of chamber ————inches
Height of boiling setting ———— inches; boiler pit required ————; size ————

be selected for its compact construction or its ability to be shipped knocked-down to facilitate its journey from the sidewalk, into the building, and into the boiler room. A few words in the specifications will preclude field complications and needless cost to the owner.

Combustion chambers should be taken into consideration in the selection of certain type boilers since they help to determine the minimum height from the boiler room floor to the top of the boiler steam piping. Oil burner manufacturers usually furnish the recommended internal dimensions of the combustion chambers required for the proper operation of their burners.

Oil burners should be selected to operate through a wide heating range and if required by heating design, should be able to operate boilers above normal heating load ranges. Since all burner designs do not incorporate equally wide operating ranges, the engineer should select such equipment which is most adaptable for his particular heating problem. High viscosity fuel oil brings up the additional problem of preheating and special ignition burner features. The engineer must consider these factors and others before making his equipment choice.

Heat exchangers, cooling towers, and evaporative condensers usually present location problems rather than those of selection. Multi-circuit direct expansion water chillers should be used when there are several refrigeration compressors to be installed to serve mutual systems. Such selection provides more compatible control of the cooling cycle. Cooling towers besides providing the needed condensing capacity should add to, rather than subtract from the architectural beauty of a building. They should be selected to keep maintenance work as low as possible. Due to the structural limitations of certain buildings, several towers may be necessary instead of one large tower. Because of the layouts of certain air conditioning systems and equipment spaces, the use of evaporative condensers may be indicated. Such situations should be investigated by the engineer to provide the prospective owner with the most suitable system in every respect.

While a great deal of information may be gleaned directly from refrigeration compressor and condenser catalogues, it is still advisable for the engineer to contact the equipment manufacturer directly for the latest information on equipment performance data, unloading mechanisms, accessories and controls furnished with the unit, and the motor horsepower recommendations for the particular model under consideration. The compressor unloader characteristics should be compatible with the anticipated cooling load range and automatic control system regulators.

The humidifying spray selection form contains the basic information for specifying the required entering and leaving air conditions and for determining the quantity of water to be sprayed. Information concerning the spray nozzles, solenoid valve and other accessories is required for drawing and specification writing purposes, and is therefore included on this same form.

Items that should definitely be included by the drafts-

SUGGESTED EQUIPMENT SELECTION FORM FOR COMPRESSORS, CONDENSERS, AND COOLING TOWERS

Project No. ———— Date ————
Building ———— Selected by ————
HVAC systems served — Checked by ————
Compressor No. RC-* — Compressor location ————

Equipment vendor selector for design purposes ————
Model No. ————; type*: recip. ————; centrif. ————
Nominal capacity*: ———— tons; No. required* ————
Suction temp.* ——°F; condens. temp.* ——°F; bhp* ——; rpm* ————
Type refrigerant* ——; lb/circuit* ——; class system ————
Type drive*: elec. motor ————; turbine ————; type drive conn.* ————
Turbine*: rpm ————; steam press. ————; make ————
Motor*: hp ——; rpm ————; type ————; voltage ————; phase ————
Overall dimensions: L—— inches x W—— inches x H—— inches; type base* ————
Total operating weight ———— lb; type motor starter ————
Type of automatic controls connected to motor starter ————

Condenser No. C-* —— Condenser location ————
Equipment vendor selected for design purposes ————
Model No. ————; No. required* ————; for RC-* ————
Heat rejection*: ————Btu/hr; water differential ————°F
Water circulated*: ————gpm; water in*: ————°F; water out*: ————°F
No. of passes*: ————; pressure drop*: ————ft; ————psi
Diameter of shell*: —— inches; length*: —— ft —— inches
Piping connections: inlet ———— inches; outlet ———— inches; vent ———— inches; drain ———— inches
Total operating weight ———— lb; mounted: below RC ————; above RC ————
Type of automatic controls mounted to condenser water piping

Cooling tower No. CT-*— Evaporative condenser No. EC-*—
Equipment vendor selected for design purposes ————
Model No. ————; No. required* ————; type* ————
Nominal capacity*: ————tons; equipment served ————
Water circulated: ——gpm; water in ——°F; water out ——°F
Water pressure required*: ————psi; makeup water required: ————gpm
Air: cfm* ————;* ———— DB °F;* ————WB °F; gear box required ————
Fan motor*: ————;* ————rpm*; type————; voltage ————; phase ————
E.C. pump motor*:——hp; ————rpm; type————; voltage, ————; phase ————
No. of E.C. refrig. circuits*: ————; type refrigerant ————
E.C. fan*: s.p.*—— inches; bhp* ——; rpm* ——; type drive conn.* ————
Overall dimensions: L——ft——inches x W——ft——inches x H——ft——inches
Operating weight ————lb; type base ————
Piping connections: water in ——inches; water out ——inches; overflow ——inches; drain —— inches; makeup —— inches; refrigerant in ——inches; refrigerant out —— inches
CT basin made of ————; depth of basin ———— inches; winterized ————
CT casing made of ————; CT fill made of ————
Type of automatic and manual controls connected to motor

Water treatment required ————

man on the equipment schedule drawings are marked with asterisks (*). Other equally essential items, not so marked, are to be used within the design office for layout, design, specification writing and record purposes.

The form on humidifying sprays is the last of the series

SUGGESTED EQUIPMENT SELECTION FORM FOR HEAT EXCHANGERS AND HUMIDIFYING SPRAYS

Project No. ———— Date ————
Building ———— Selected by ————
System No.* ———— Checked by ————
Water chiller No. WC-*—— Hot water convertor HWC-* ——
Equipment vendor selected for design purposes ————
Model No. ——; No. required* ——; equipt. location*——
Load on WC* ————tons; load on HWC* ————Btu/hr
Water*: gpm ————; temp. in ————°F; temp. out ————°F
No. of passes* ————; water pressure drop* ———— ft or ————psi
Steam pressure at HWC*: —— psi; condensate*: —— lbs/hr
Type of refrigerant in WC*: ————; suction temp. ————°F
Effect. surface* ————sq ft; MED* ————°F
No. of circuits* ————; type of baffling* ————
Diameter of shell* ————inches; length of shell* ————ft ————inches
Operating weight of heat exchanger ————lb
Type of automatic controls to be used with heat exchanger

Equipment vendor (equal) ———— Model No. ————
Equipment vendor (equal) ———— Model No. ————
Humidifying sprays No. HS-* ———— For system No. ————
Equipment vendor selected for design purposes ————
Model No. ——; No. required ——; field fabricated type ——
Total air through sprays ————cfm; spray water temp. ——°F
Entering air*: ————DB; ————WB; ————% RH; ———— grains/lb air
Leaving air*: ————DB; ————WB; ————% RH; ———— grains/lb air
Moisture differential in grains/lb air ————
Theoretical total moisture to be sprayed:

$$\text{GPM} = \frac{\text{cfm through sprays} \times \text{moisture diff in grains/lb air}}{778{,}439}$$

$$\text{GPM} = \text{————————} \text{ (theoretical)}$$

Humidifying efficiency assumed ————%

$$\text{Required gpm to be sprayed} = \frac{\text{theoretical gpm} \times 100\%}{\text{efficiency}} = \text{*——}$$

Spraying pressure provided by: pump ————; city water pressure ————
Pump No. P- ———— is described on Pump Selection form.
Type of automatic controls to be connected to sprays ————

Nozzles
Vendor selected for design purposes ———— Model No. ————
Make-up water press.*: ——psi; pressure at nozzles*: ——psi
Gpm per nozzle*: ————; No. of nozzles required*: ————; angle of spray ————°
Number of banks*: ————; distance of nozzle to face of heating coil ————inches
Make-up water size ——; pressure reducing valve required——
Solenoid Valve
Vendor selected for design purposes ———— Model No. ————
Capacity ————gpm; valve size ————inches; pressure drop through valve ————psi

presented in this article, the purpose of which has been to draw more attention to the matter of equipment selection. There are many other phases of heating, ventilating and air conditioning design work which could be simplified to some degree by the use of standardized forms in order to lighten the engineer's burden of routine functions and to improve plan production.

The author realizes that standardization has a few inherent evils of its own, but he believes that the discriminating reader will be able to discern the basic and outstanding advantages to be derived from specially prepared forms.

Higher Court Decisions Regarding

Competitive Acts of Ex-employes

LEO. T. PARKER

Attorney at Law, Cincinnati, Ohio

There have always been disputes of what limiting factor, if any, an individual can exercise over the acts of a former employe, or what legal redress can be obtained if this employe becomes a competing factor. These points are covered in a review of higher court decisions.

MODERN higher courts consistently hold that an employe may take competitive employment if he is honest in his dealings and does not attempt to take undue advantage of his ex-employer, and did not sign an agreement not to take competitive employment.

For illustration, in Padover Company v. Axelson, 167 N. E. 301, it was disclosed that there was no written contract between an employer and his employes preventing the employes from entering the employment of a competitor. Three of the employes resigned their jobs and formed a competing company. These men began soliciting business from the former patrons of the former employer and were successful in obtaining from 33 to 50 per cent of the customers whom they served while in the employ of their former employer.

They did not copy the list of customers from their former employer, but simply solicited business from all prospects generally.

The former employer filed suit to restrain the employes from continuing their business. However, it is interesting to observe that the higher court did not hold the employes liable, and refused to grant an injunction, stating the following important law:

"There is a plain distinction between cases where an agent, clerk, or salesman leaves one employer and uses his skill and knowledge of the trade in the service of another, and where there is a violation of trust and confidence and confidential information, secured solely through his employment, which is used to the injury of his former employer . . . These appellants (employes) had the right to earn a living among the people to whom they were known, and they should not be enjoined from going into business for themselves, or entering the employ of another, and seeking the patronage of business acquaintances who became such in the course of a previous employment . . . No written or printed list of the plaintiff's (Padover's) customers was copied, and no information confidentially acquired as to the details of the plaintiff's business was used by them."

For comparison, see Empire v. Lozier, 130 Pac. 1180. Here it was shown that an employe endeavored to utilize a list of the names of his ex-employer's customers. The court promptly held this act illegal, saying:

"There can be no question . . . but that the employe's agency was one of trust and confidence . . . The names of the customers of a business concern whose trade and patronage have been secured by years of business effort and advertising, and the expenditure of time and money, constituting a part of the good will of a business which enterprise and foresight have built up, should be deemed sacred."

Also, in the leading case of Colonial, 138 Atl. 47, in holding it unlawful for a discharged or ex-employe to use a list of names copied from a former employer's books, or otherwise obtained, the court said:

"When a selected list has been built up by labor and expense on the part of the employer and is secretly imparted to a specific employe for a specific purpose, it is not a part of the employe's general knowledge which may be freely used anywhere."

In another leading case Steves & Company, v. Stiles, 71 Atl. 802, it was shown that an employe made a list of names and addresses of his employer's patrons. The employe quit his job and established a competing business. The former employer instituted legal proceedings against the proprietor of the new business, or the past employe, and asked the court to restrain his using the list of names of the customers on the grounds that the employe had "surreptitiously", fraudulently, and without the knowledge of the employer copied the names of a great number of patrons, with their post office addresses.

It is interesting to observe that the court granted an injunction restraining the former employe from using or keeping in his possession the list of names, and said:

"We are of the opinion that the surreptitious copying of the names and addresses of the employer's customers. from the records, is a violation of confidence of such lists so unfairly obtained. The respondent (employe) could have no more right to copy records made by himself, while acting for the employer, than he would have to copy any other records to which he had access."

Heavy Damage Allowance

Recently a higher court held that all Sales Managers are obligated to serve employers faithfully, and not divulge trade secrets or unfairly acquire secret profits.

For illustration, in A. Hollander & Son v. Imperial Corporation, 66 Atl. (2d) 319, the testimony showed facts as follows: One Singer took employment as a sales manager. He was paid $7,500 a year under a written contract. After working for several years Singer secretly organized a competing company, the Imperial Corporation. Singer kept in telephone communication with the latter company but did not appear at its plant for fear of disclosing his interest in the competing company. The employer sued Singer and asked the court to compel

Singer to repay $15,000 salary received during the past two years during which time the Imperial Corporation was in operation. The higher court held in favor of the employer and said:

"The record establishes beyond doubt Singer's infidelity to Hollander (employer) through failure to serve faithfully and exclusively. Singer is not entitled to retain the salary paid to him amounting to $15,000.

Contract is Valid

Modern higher courts consistently hold that a contract between an employer and employe, wherein the latter agrees not to enter into a competing business, or engage himself with a competing firm, is valid and enforceable provided the restrictions are reasonable.

For instance, in the leading case of Eigelbach v. Boone, 287 S. W. 225, it was disclosed that a contract existed between an employe and his employer which contained a clause, as follows: "I further agree that, in the event my employment is terminated for any reason, I will not injure or attempt to injure your business or the business of your clients or associated interests by communicating with or otherwise getting in touch with your customers, directly or indirectly, in any way, form, or manner; but, on the other hand, by my conduct and action, I will at all times do all I can to make friends for you. I further agree that, in the event of termination of my employment for any reason, I will not engage in the same or similar line of business in the same city, or county, either for myself or another person, firm, or corporation, for the period of one year immediately following the termination of my employment by you."

Soon after the employe terminated this employment he became engaged in a competitive busines. In subsequent litigation, the court promptly granted an injunction against the ex-employe remaining in the competitive business.

On the other hand, it is important to know that a contract obligating an employe not to enter into a competitive business, or hire himself to a competitor, must not contain unreasonable stipulations. Under no circumstances should the contract specify territory of greater area than is actually required to adequately protect the employer. And the period of time for which the employe is bound by the contract should be not more than one to two years. See Smith, 6 Atl. 2510.

In another litigation, Diamond v. Roeber, 13 N. Y. 419, a contract was held void which specified that the employe agreed to not "at any time within 99 years enter into a competing business or become engaged with a competing firm in any of the States or territories of the United States". In this instance, both the duration of the obligation and the extent of the territory were unreasonable and unnecessary to provide adequate protection for the employer.

Portable Meter Checks Air Infiltration

A portable air infiltration meter designed by C. W. Coblentz of the National Bureau of Standards provides an improved means for determining the rate of air infiltration between different rooms of a building and the outside.

In the past, precise infiltration measurements have been restricted to laboratory installations because the equipment was cumbersome. The NBS instrument, however, being portable and compact, lends itself well to field investigations.

Using a method developed by W. G. Marley of England, the change in concentration of a tracer gas, due to infiltration of outside air, is measured as an index of the air change rate. Since it has been shown that the number of air changes occurring during a given time is equal to the natural logarithm of the ratio of the tracer gas concentration at the beginning and at the end of the time interval, absolute concentration measurements are unnecessary. Only the percentage change in concentration need be measured, and this can be determined readily by noting the change in thermal conductivity of the tracer gas-air mixture as the test progresses.

It was found that helium is very satisfactory as a tracer gas because of its high thermal conductivity compared to air. Small changes in helium concentration result in significant changes in thermal conductivity of the helium-air mixture which can be measured with sufficient accuracy using relatively simple instrumentation.

In each probe of the Bureau's meter are two matched and equally heated thermistors, which are connected to form two legs of a Wheatstone bridge circuit. They are installed in identical cylindrical cavities of a metal block to provide equivalent heat-absorbing surfaces. One cavity is air-filled and hermetically sealed while the other has small holes at the top and the bottom. This cavity is continuously ventilated through the holes by natural convection induced by the heated thermistor. Since the thermal conductivity of helium is about six times that of air, the thermistor in the ventilated cavity will be cooler than the other by an amount dependent on the quantity of helium "contaminating" the air.

The resulting change in the temperature of the thermistor causes an inverse change in its resistance. Thus any significant change in helium concentration, due to infiltration of outside air into the room under observation, unbalances the Wheatstone bridge circuit, and the effect can be read directly on a microammeter.

A practically constant heating current for the thermistors is obviously essential and, to obtain it, a variable transformer is used on the a-c side of a full-wave selenium rectifier. This transformer is manually adjusted to compensate for changes in line voltage, in the d-c voltage caused by aging of the rectifier, and for variation in voltage drop across the rectifier resulting from use of a different number of probes during each test. Fluctuations in the line voltage after the adjustment is made are compensated for by using a voltage regulator tube in each probe circuit and by employing a variable resistance tube as the series resistor for the voltage regulator tube. With this combination, line voltage variations in the range from 70 to 120 volts cause less than 0.4 per cent change in the thermistor current.

Centrifugal Pump Shafts and Shaft Sleeves

IGOR J. KARASSIK and ROY CARTER

Centrifugal Pump Division, Worthington Corp., Harrison, N. J.

This is fifth in a series of articles on factors in centrifugal pump design and operation. This month, the authors discuss critical speeds, shaft deflection, and design.

THE shaft of a centrifugal pump is the center of the rotating element, and is designed to give a certain maximum deflection. This generally results in shaft diameters in excess of safe needs of actual strength for torque transmission. The transverse loading, its distribution, the shaft span, and the diameter of the shaft determine the minimum deflection for the static conditions, that is when the pump is not rotating. When the shaft rotates, there are naturally reversals in stress, which affect the life of the shaft.

In general, the shaft is proportioned so that it can successfully withstand stresses set up when the pump is started up quickly as for instance, when the driving motor is thrown directly across the line. Again if the pump is handling hot liquids, the shaft is designed to withstand the stresses set up when the pump is started from a cold condition without a preliminary warming-up.

Critical Speeds

Since the shaft diameter is intimately selected with critical speed, it is necessary to present a few facts of a general nature on this subject.

Any article made of an elastic material has a natural period of vibration. If a pump rotor or any shafting is rotated at any speed that corresponds to the natural frequency of the shaft or rotor, any minor unbalance will be magnified. These are the critical speeds. Due to variations in the density of metal and minor irregularities it is impossible in any rotor to have the center of mass exactly on the axis of rotation. Thus, even in vertical shafting where there is no deflection due to the weight of the parts, this eccentricity of the center of mass causes a centrifugal force and, therefore, a deflection and vibration. The lowest critical speed is called the first critical speed, the next higher is called the second, etc.

In centrifugal pump nomenclature, a rigid shaft means one for which the first critical speed is higher than the operating speed, while a flexible shaft is such that the operating speed is higher than its first critical.

Once the operating speed has been selected, it still remains for the designer to determine the relative dimensions of his shaft, in other words to decide whether the pump will operate above or below the first critical speed. Generally speaking, the shaft dimensions of single stage centrifugal pumps are such that the operating speed is considerably lower than the first critical. However, the designer has to face this problem when it comes to laying out a multistage pump.

In order to understand the effect of critical speed selection upon the shaft size, it is necessary to consider that the first critical speed of a shaft is linked to the static deflection of this shaft by an immutable mathematical relation. The shaft deflection is dependent upon the weight of the rotating element, the shaft span and the shaft diameter, the basic formula being:

$$f = \frac{WL^3}{MEI}$$

where: f = deflection in inches
W = weight of the rotating element
L = shaft span in inches
M = coefficient depending on method of shaft support and distribution of load
E = modulus of elasticity of the shaft material
I = moment of inertia, that is $\pi d^4/64$

This formula is given in its most simplified form, that is for a shaft of constant diameter. If, as is usually the case, the shaft is of varying diameters, the calculations for shaft deflection are more complex and generally it becomes more practical to solve for the deflection graphically.

It is also necessary to remember that this formula solves for the static deflection which alone enters into the computation of the critical speed. The actual deflection of the shaft—which needs be determined to establish the minimum permissible internal clearances—must take into account all the transverse hydraulic reactions on the rotor

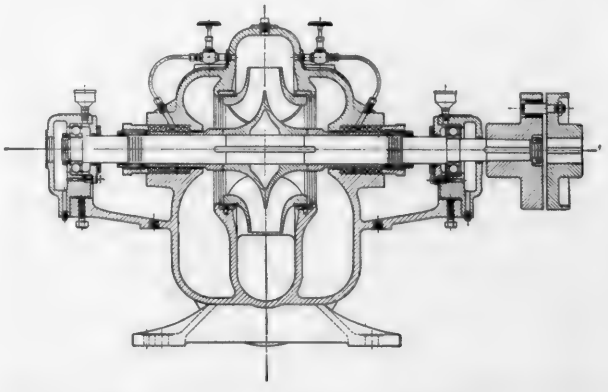


Fig. 1. Rotor assembly of a single stage double suction pump.

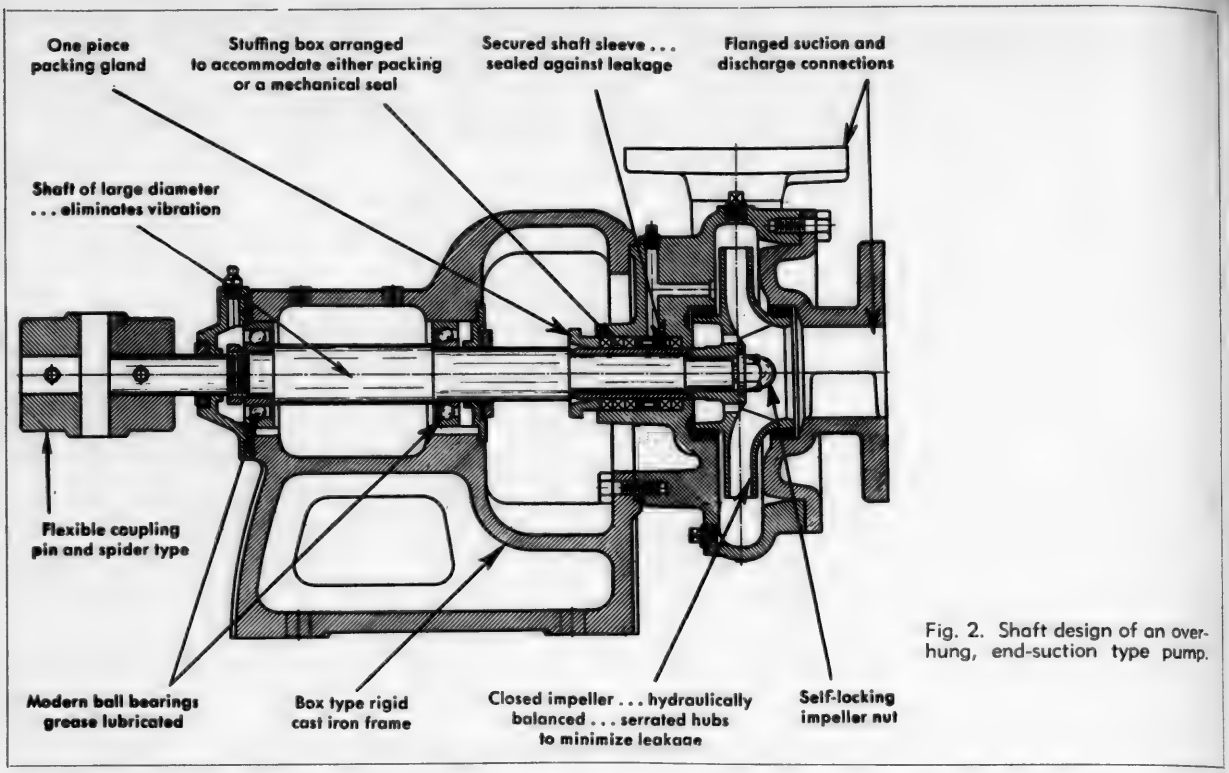

One piece packing gland
Stuffing box arranged to accommodate either packing or a mechanical seal
Secured shaft sleeve . . . sealed against leakage
Flanged suction and discharge connections
Shaft of large diameter . . . eliminates vibration
Flexible coupling pin and spider type
Modern ball bearings grease lubricated
Box type rigid cast iron frame
Closed impeller . . . hydraulically balanced . . . serrated hubs to minimize leakage
Self-locking impeller nut

Fig. 2. Shaft design of an overhung, end-suction type pump.

and other external loads, such as belt pull as well as the actual weights of the rotating element.

For practical purposes, the first critical speed in rpm can be calculated as:

$$N_c = \frac{187.7}{\sqrt{f}}$$

A 1750 rpm operating speed necessarily involves a shaft having a critical speed above the operating speed—one where the calculated deflection may be from 0.002 to 0.006 inch, so that contact of the rotor with the stationary wearing rings is avoided. On 3600 rpm multistage pumps, shafts of equal stiffness are used, again to avoid contact at the wearing rings. However, the corresponding critical speed in this case may be below the operating speed, somewhere between 60 and 75% of the latter. This is sufficient margin to avoid potential danger of operation in the close vicinity of the critical.

As long as the operating speed is sufficiently removed from the critical speed, and as long as the shaft deflection is properly taken into consideration in setting the running clearances, it matters very little whether the first critical speed is above or below the operating speed. A well balanced pump with a flexible shaft is a safer piece of equipment than a poorly balanced, rigid shaft pump.

Shaft Design Details

It has been stated that shaft diameters are generally in excess of the dimensions actually needed to transmit the torque. This, incidentally, is as it should be, for ease of assembly demands that the shaft diameter be stepped up several times from the coupling end to its center where the impellers are to be mounted. Fig. 1, which shows a typical shaft assembly for a single stage pump, illustrates this excellently. Starting with the maximum diameter at the impeller mounting, there is a stepdown for the shaft sleeves, a second for the external or sleeve shaft nut, followed by several more steps for the bearings and the coupling. It is clear, therefore, that the shaft diameter at the impellers not only exceeds that required at the coupling for torsional strength, but that care must also be taken in the design to provide sufficient diameter difference for the necessary steps.

The shaft design of end suction, overhung, impeller type pumps presents a somewhat different problem. One of the solutions used to reduce the shaft deflection at the impeller and at the stuffing box (where concentricity of running fits is extremely important) consists of increasing the shaft diameter very appreciably between the bearings, as illustrated in Fig. 2. Another solution is to shorten the shaft span between the bearings. This results in a much more compact unit.

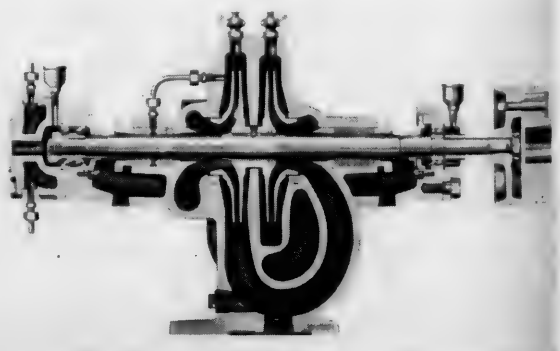


Fig. 3. Section of a medium pressure two stage pump with stainless steel shaft and no shaft sleeves.

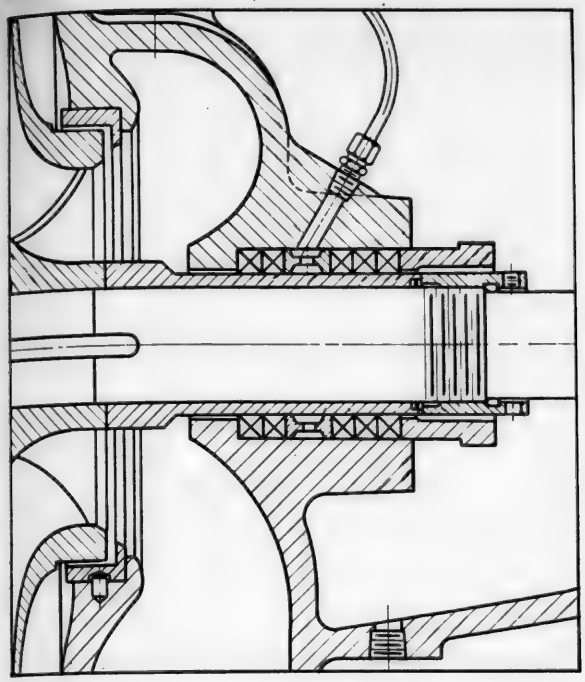


Fig. 4. Sleeve with external lock-nut and impeller key extending into sleeve to prevent slip.

Shaft Sleeves

The function of a shaft sleeve is to protect the shaft from corrosion, erosion and wear. When sleeves are used, wear, erosion and corrosion do not affect the strength of the shaft and the cost of maintenance is reduced. There are many forms of shaft sleeves used in centrifugal pumps, the most common being those used to protect the shaft where it extends through a stuffing box. Generally sleeves serving other functions are given specific names to designate their purpose.

Shaft sleeves have certain disadvantages when applied to extremely small size pumps. Since the thickness of the sleeves cannot be decreased beyond a safe structural minimum, the suction area of the impeller is appreciably reduced by the increase in effective shaft diameter. Further disadvantages result from increased hydraulic and stuffing box losses because of this increase in effective diameter out of proportion to the small size of pump.

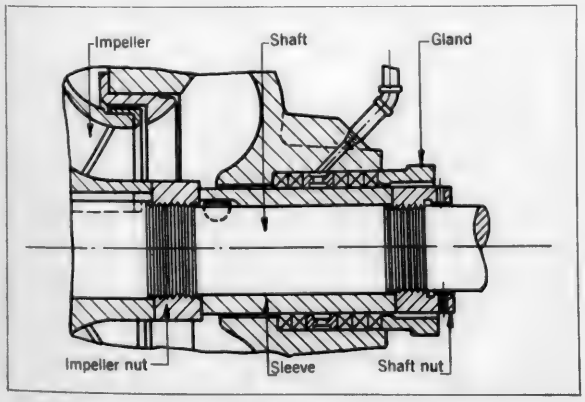


Fig. 5. Sleeve construction with internal impeller nut, external shaft sleeve nut and separate key for sleeve.

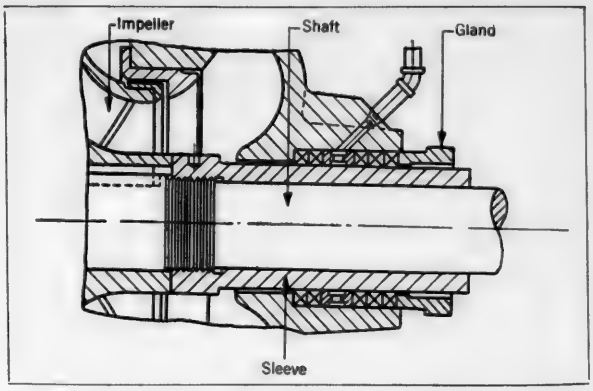


Fig. 6. Sleeve threaded onto shaft, no external lock nut.

As a result, very small pumps are frequently built with stainless steel shafts which have metallurgical properties of corrosion and wear resistance sufficient to permit satisfactory operation without shaft sleeves. Such a pump is illustrated in Fig. 3. It must be noted that this also leads to a less expensive construction and that the cost of replacing a stainless steel shaft when it is sufficiently worn is of the same order of magnitude as the cost of new sleeves plus the cost of their installation.

In medium size centrifugal pumps with two external bearings on opposite sides of the casing, the common double suction and multistage varieties, the favored shaft sleeve construction at the stuffing boxes is one in which the sleeve is held in axial position against the impeller hub by an external shaft nut. The shaft sleeve is prevented from rotating by a key, usually an extension of the impeller key, as illustrated in Fig. 4. If the pump has considerable axial thrust for some reason so the frictional grip of the impeller on the shaft is exceeded, this axial thrust is transmitted through the sleeve to the external shaft nut. In larger high head pumps, the possible axial load on the sleeve may be high favoring a design as shown in Fig. 5 which has the added commercial advantage of a simple, less expensive, sleeve to be replaced when worn. A few manufacturers have favored a sleeve design as shown in Fig. 6 in which the impeller end of the sleeve is threaded and screwed on a matching thread on the shaft. With this type of sleeve a key cannot be used and right

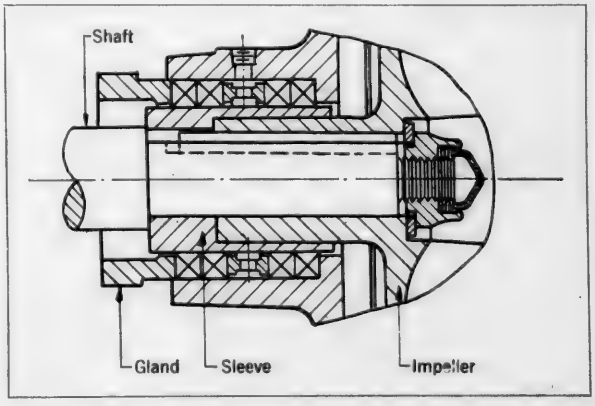


Fig. 7. Sleeve for pumps with overhung impellers having hubs extending into stuffing box.

and left hand threads are used so the frictional grip of the packing on the sleeve will tighten it against the impeller hub. With sleeve designs as in Figs. 4 and 5, right hand threads are usually used for all the shaft nuts as the sleeve is prevented from rotating in the shaft by keys. As a safety precaution the external shaft nuts as in Figs. 4 and 5 and the sleeve itself as in Fig. 6 have set screws as a locking device.

In pumps with overhung impellers, sleeves take various forms. Often the stuffing boxes are close to the impeller and the sleeve actually protects the impeller hub from wear as in Fig. 7. Having a portion of the sleeve fitting on the shaft allows holding it from rotating by the impeller key, while it is held in an axial position because a portion of the sleeve is clamped between the impeller and a shoulder in the shaft.

When pumps are specifically designed for high temperature or high pressure service, a refinement of construction may be introduced, consisting of packing between the shaft sleeve and the adjoining impeller hub, which prevents all possbility of leakage between the sleeve and the shaft.

Next month—stuffing boxes and packing.

Chemical Clue to Smog Deaths Described

The invisible killers in great, death-dealing smogs appear to be tiny particles of acidic salts that dissolve in the fluids of the respiratory tract and cause acute irritation of the surrounding tissues, a chemical engineer told the American Chemical Society September 14 at its 126th national meeting in New York.

New research techniques—applied to air samples from the Donora, Pa., smog of 1948 and the great London smog of 1952 in which more than 4,000 persons died—indicate that the guilty substances, known technically as metallic ammonium sulfates, come from coal smoke, asserted W. C. L. Hemeon, engineering director of the Industrial Hygiene Foundation of America, Inc., of The Mellon Institute, Pittsburgh, Pa.

Fatalities and illnesses in acute smog episodes probably are the result of simple irritation of the respiratory tract by these substances and are not due to systemic poisoning by sulfur dioxide or other atmospheric gases, Mr. Hemeon said. He identified the irritant particles as acidic salts—usually the sulfates and chlorides of ammonia in combination with zinc or other metals.

Previous studies of the major smogs have failed to pin-point lethal agents, and speculation has ranged from vague use of the term "air pollution" to sulfur dioxide gas, Mr. Hemeon noted.

The new research described by the speaker was unique in two respects, he explained. First, an effort was made to analyze only tiny particles, less than five microns (one 5-thousandth of an inch) in diameter, since there is biological evidence that larger particles do not penetrate deeply into the respiratory tract. This was done by using special filter-paper collectors.

And secondly, acting on the hunch that any substance producing major irritation of the respiratory tract must do so by solution in fluids of the respiratory system, the chemical engineer concentrated his analyses on the water-soluble fractions of smog-sample particles and discarded insoluble material.

About 22% of the particles in a sample of polluted air preserved from the 1948 Donora smog proved to be water-soluble, Mr. Hemeon said.

Calculations based on quantitative and spectrographic analysis and x-ray diffractions of this water-soluble material showed that it probably contained about 58% zinc ammonium sulfate or other metallic ammonium sulfates, he reported. Similar analysis of typical air samples taken recently from two towns near Pittsburgh showed only 9 to 13% of this salt, he added.

The Donora sample also contained 21% zinc sulfate, against none in the comparison specimens.

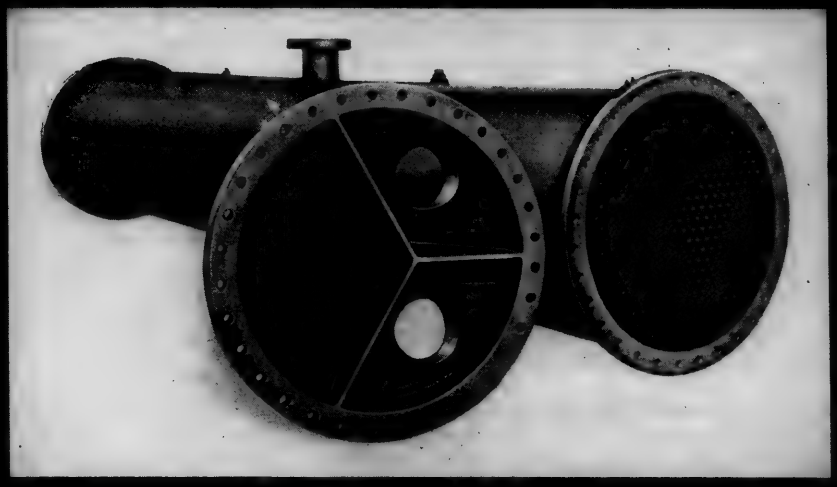
Water-soluble particles from the London smog proved to be composed chiefly of ammonium chloride and calcium sulfate in combination with traces of sodium, potassium, aluminum, magnesium, zinc and other metals, Mr. Hemeon said, adding:

Such salts (the sulfates and chlorides of ammonia) may be the primary substances responsible for respiratory irritation in smog episodes . . . it is readily demonstrable that ammonium chloride and ammonium sulfate are irritating on inhalation . . .

The sulfur in the sulfates obviously originates from the combustion of coal. It may unite directly with metallic compounds to form soluble sulfur salts . . . which become sulfates. This hypothesis would relieve one of the necessity for adherence to the idea that has wide credence . . . that sulfur dioxide gas is directly capable of irritation of the respiratory tracts, even in low concentrations around two parts per million, which is the highest concentration appearing during smog episodes. It appears to us that sulfur dioxide gas is significant only as it becomes transformed to ammonium and metallic salts.

The preponderance of evidence indicates that the irritant is particulate matter, whether liquid or sold, rather than gaseous, the chemical engineer said, and further study of the water-soluble fraction of smog particles can be expected to yield more clear-cut information. He concluded:

There are not in existence any scientific data to illuminate the question of chronic health hazards from air pollution. There is, however, no question concerning the effects of acute air pollution exposures.



Shell and Tube Condensers for Use in a Refrigerating System

O. B. WERT

Manager, Technical Data and Training Section,
Air Conditioning and Refrigerating Division, Worthington Corporation

HEATING AND VENTILATING'S REFERENCE SECTION

Shell and Tube Condensers

for Use in a Refrigerating System

O. B. WERT

Manager, Technical Data and Training Section, Air Conditioning and Refrigeration Division, Worthington Corporation

A group of graphs and design data are presented to simplify the selection of a shell and tube condenser to remove heat from a refrigerant gas.

THE function of a condenser in a refrigerating system is to remove heat from the refrigerant gas discharged from the compressor and condense it to a liquid. Two types or designs of condensers in general use today are the shell and tube, and evaporative types. Which type to select is influenced by many factors. Even with a shell and type design, there are many governing elements before an engineer can definitely indicate what is wanted in a particular unit.

Principles Have Wide Application

Information presented will cover primarily Freon condensers of the shell and tube type. However, the same basic principles should be used to determine the selection shell and tube condensers where other refrigerants such as ammonia, propane, etc., are used. The available quantity, character and temperature of the cooling water used in the shell and tube condenser, will greatly influence the condenser or head pressure in a system and determine how large a condenser must be used for the particular application. Various restrictions and limitations will be present on some projects that will not be a factor on a similar size job where the condenser is installed at another location.

With the exception of small self-contained condensing units, the refrigerant condenser may be sized to best fit the specific requirements of the installation.

Choosing a condenser necessitates considering all of the following twelve points, which are listed in their order of importance:

Capacity
Temperature of cooling water
Source of cooling water
Quantity of cooling water
Disposal of cooling water
Character of cooling water
Cleaning and maintenance
Initial cost
Operating cost
Design of shell and heads
Refrigerant
Heat transfer

Condenser size depends mainly upon the quantity of heat to be rejected to the cooling water per hour, the design of the condenser, the condensing temperature, and the temperature and quantity of water available.

The amount and temperature of the cooling water determines the condensing temperature and pressure, and has some effect on the operating costs of the compresser.

The condensing temperature is made up of the sum of the entering cooling water temperature, the number of degrees rise of the water going through the condenser, and the terminal temperature difference assumed between the leaving water temperature and the condensing temperature.

The heat to be rejected to the cooling water per pound of refrigerant is equal to the heat content of the super-

TABLE 1.—HEAT REMOVED IN CONDENSING FREON 12 VAPOR BASED ON 65F SUCTION GAS TEMPERATURE

Suction Temp., F	Condensing Temperature, F: 70	75	80	85	90	95	100	105	110	115	120
	BTU per Min per Ton Removed from Freon 12 Vapor Condenser										
—20	266	272	279	286	293	301	309	318	327	336	...
—15	260	266	272	279	286	292	300	308	310	323	...
—10	255	260	266	272	278	284	291	297	304	311	318
— 5	249	254	260	265	271	277	283	289	295	301	308
0	243	248	254	259	264	270	275	281	286	292	298
5	238	243	248	253	258	265	268	274	278	284	289
10	234	238	243	248	252	257	262	267	272	277	281
15	230	234	238	243	248	252	257	261	266	271	276
20	226	230	234	239	244	248	253	257	262	267	271
25	223	227	230	235	240	243	248	252	257	261	265
30	220	224	227	231	236	239	244	248	252	256	260
35	216	220	224	227	232	235	240	243	248	251	255
40	212	216	220	223	228	231	236	240	244	247	251
45	208	212	216	219	224	227	231	235	239	242	246
50	204	208	212	215	219	223	227	231	234	238	242

heated refrigerant vapor after compression, minus the heat content of the liquid at the condensing temperature. The Mollier diagram offers a convenient means of finding these values. Where machine capacities are known, the values tabulated in Table 1 for Freon 12, and in Table 2 for Freon 22, provide a quick method of calculating the Btu per hour to be transferred to the cooling water.

A supply of condensing water is generally secured from city mains, rivers, wells and ponds. However, in many cities, the use of water from the city mains for air conditioning and refrigerating equipment is so restricted, that it is necessary to install cooling towers to conserve water. The closed shell and tube condenser is particularly adapted for cooling tower operation. Usually the condenser and cooling water pumps are located in the engine room. The total dynamic head of the water pumps is made up of friction of the water passing through the condenser tubes and heads, pipe friction plus the pumping head of the height of the cooling tower, and the pressure required at the spray nozzles. The static head on the column of water between the roof and the engine room is balanced. Unless the water lines are exceptionally long, the pumping heads should not exceed 100 ft.

Cooling towers, unfortunately, produce the warmest condensing water at the time when the cooling load on the system is greatest, so the refrigeration equipment must be designed to adequately carry the maximum load at abnormal condensing water temperatures.

The cost of water used for condensing is small, as the required amount is to make up for the loss of water by evaporation and windage in the cooling tower itself.

The problem of water disposal is eliminated when cooling towers are used. Water taken from rivers can in most cases be returned to the source downstream from the intake, but when city water is used, excessive loads upon sewage systems are common.

The surface required for any condenser can be found by the equation:

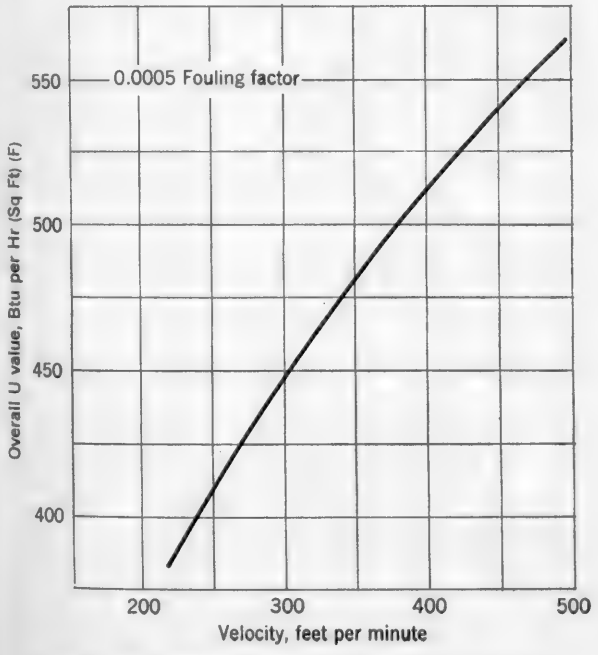


Fig. 1. Heat transfer curve for a copper finned tube.

A native of Pennsylvania, O. B. Wert has been associated with Worthington Corporation for 25 years. Born in Bloserville, he graduated from Pennsylvania State University (then known as the Pennsylvania State College) in 1928 with a B. S. in Mechanical Engineering. For one year he served as a test engineer with the Engineering Experiment Station, State College, Pa., joining Carbondale Machine Company, predecessor of Worthington Air Conditioning and Refrigeration Division, in 1929. In 1934 he was transferred to the Worthington Harrison Works as supervisor of the Air Conditioning and Refrigeration Application Engineering Department, serving here until 1953 when he was named manager of the Air Conditioning and Refrigeration Division Technical Data and Training Section at Harrison Works. Mr. Wert is Treasurer of the Morris County Chapter, N. J. Society of Professional Engineers and First Vice Chairman, Northern N. J. Section, ASRE.

TABLE 2.—HEAT REMOVED IN CONDENSING FREON 22 VAPOR BASED ON 15F SUPERHEAT AT COMPRESSOR INLET

Suction Temp., F	Condensing Temperature, F: 75	80	85	90	95	100	105
BTU per Min per Ton Removed from Freon 22 Vapor Condenser							
—40	280	289	293	299	305	312	318
—35	276	283	288	293	298	306	312
—30	271	278	283	288	293	300	305
—25	266	273	278	283	288	294	299
—20	262	268	272	277	283	288	293
—15	258	264	268	272	278	282	288
—10	254	260	264	268	273	278	283
— 5	250	256	261	264	269	273	278
0	247	252	257	259	265	268	273
5	243	248	253	255	262	264	269
10	240	245	249	252	257	260	265
15	237	241	244	248	252	255	261
20	234	238	241	245	248	252	257
25	231	235	237	242	245	249	254
30	228	232	235	238	242	245	250
35	226	229	232	236	239	242	247
40	223	226	229	233	236	239	244

$$S = \frac{\text{Btu/hr rejected to condenser}}{U \times \text{Log}_e \text{ MTD}}$$

where

S = Square feet of effective surface.
U = Heat transfer value in Btu per hr (sq ft) (F).
MTD = Log mean temperature difference.

As an example, a typical heat transfer value curve for $\frac{5}{8}$ inch O.D. copper finned condenser tube is shown in Fig. 1.

Evaluation for U

The heat transfer value *U* is the most difficult part of the equation to evaluate correctly for a specific job, since many factors can change its value. The type of water, water velocity and the frequent cleaning of the tube surface should be considered in its evaluation. Manufacturers' condenser rating tables are assembled on the basis of various fouling factors. For instance, Figs. 2, 3, 4 and 5 show condenser performance with .0005 and .001 factors.

To prevent too frequent cleaning of condensing surface, the condenser should be supplied with sufficient excess surface to maintain the designed condensing temperature. Fouling factors have been set up for copper and

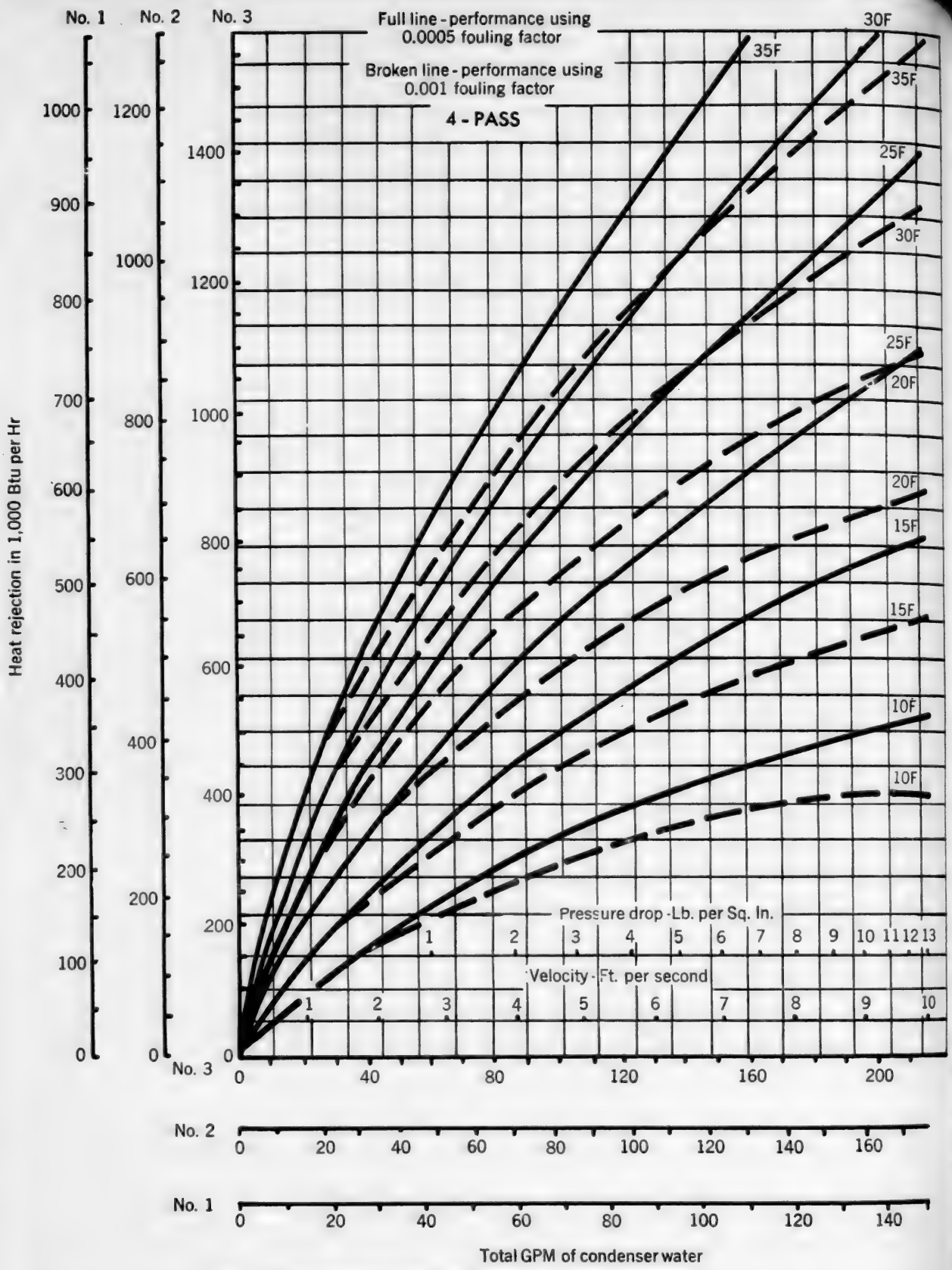


Fig. 2. Condenser performance for a horizontal 4-pass condenser.

steel tubes. Recommended values for normal service are .0005 for copper and .001 for steel. Water pressure drop through condenser water tubes and heads should not exceed 35 ft. Water velocity through the tubes should not exceed 8 fps to minimize erosion of the tubes.

All condensers should be constructed in accordance

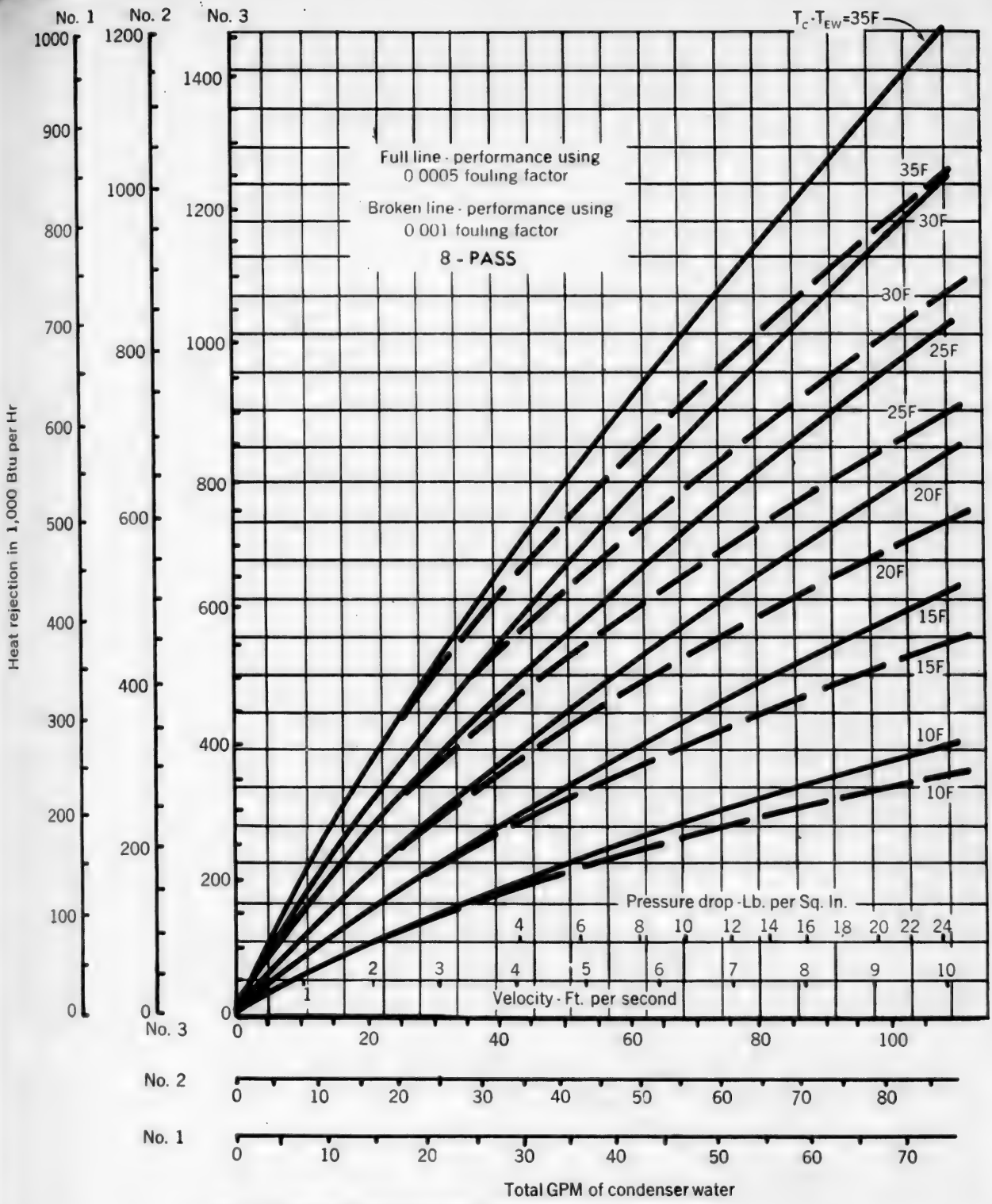


Fig. 3. Condenser performance for a horizontal 8-pass condenser.

with the ASME Unfired Pressure Vessel Code for the design pressure needed for each refrigerant. The water boxes must be sufficiently thick to resist the pressure imposed on them by either the static pressure or by the condenser water pumps.

For every refrigerating system there will be a number of condensers having adequate tube surface since shells are manufactured in many sizes ranging from 8 to 60 inches in diameter and from 5 to 18 ft in length. Practically all modern lines of Freon condensers use finned tubes of less than one inch diameter since the heat transfer rate is more advantageous than with larger diameter tubes, and a greater amount of surface can be placed in a given shell diameter.

The cooling water in multi-pass condensers flows through a portion of the number of parallel tubes in the

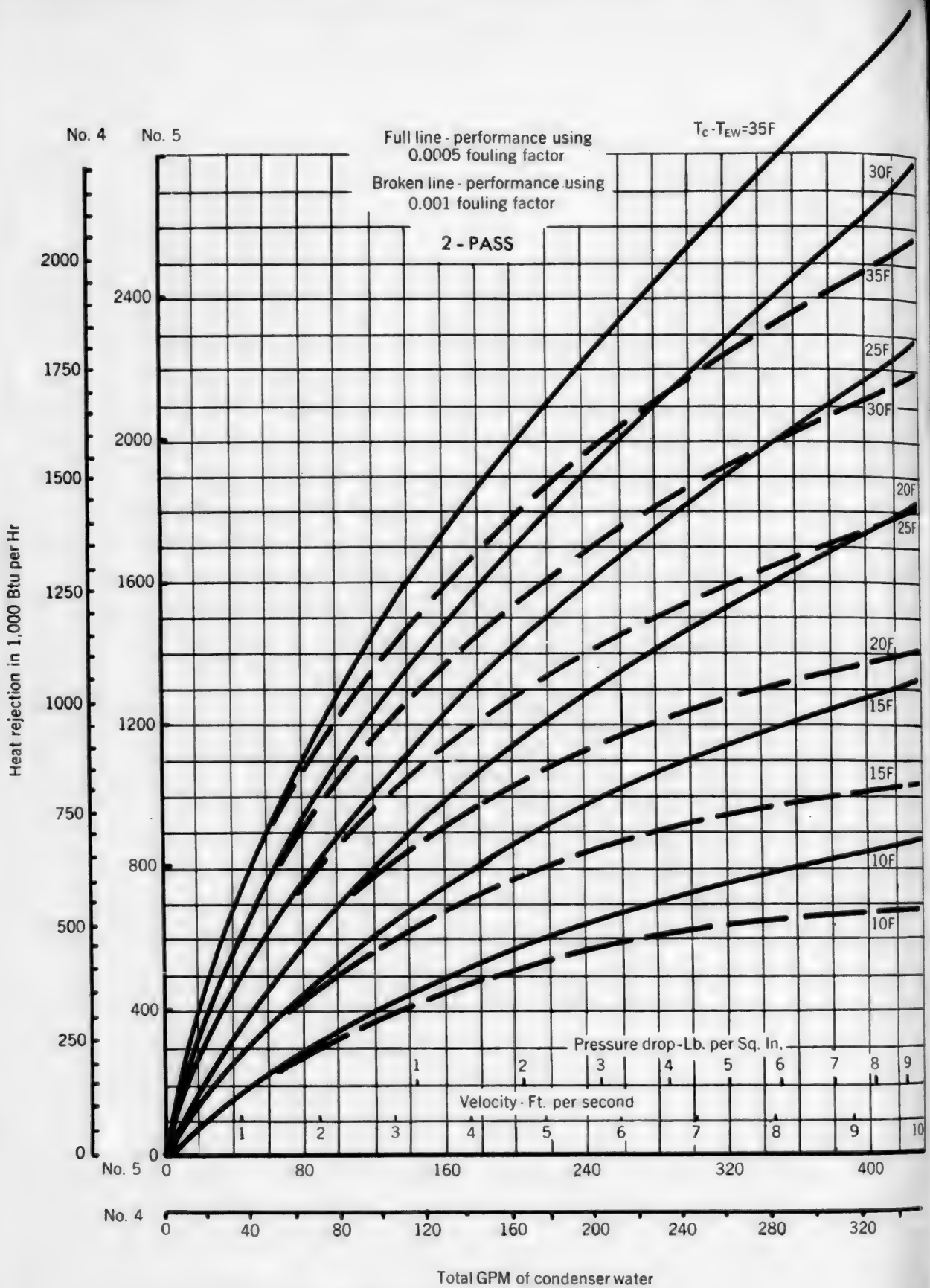


Fig. 4. Condenser performance for a horizontal 2-pass condenser.

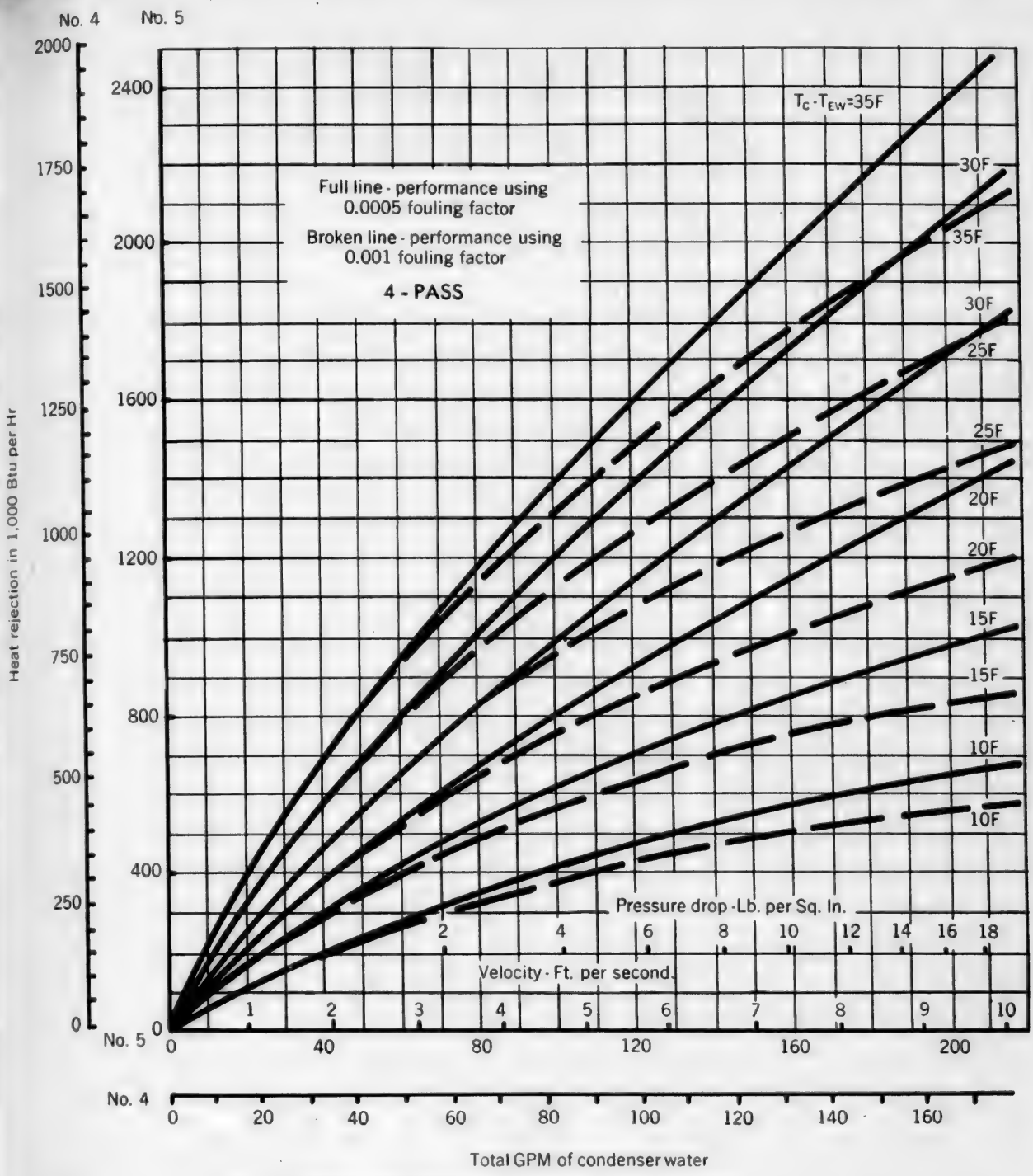


Fig. 5. Condenser performance for a horizontal 4-pass condenser.

shell for each pass, and the division of tubes is determined by the size and number of passes for each design. Each time the water goes through a set of tubes it has made one pass through the condenser. A multi-pass shell may have two to ten passes, or in special cases an even greater number. Thus, if a four-pass shell is required, the water will be required to flow through one group of tubes, back through others—and in all through four groups of tubes—from the point where the water enters, until it leaves.

The flow of water back and forth through the shell is accomplished by the water boxes or heads bolted to the ends of the shell. The number of ribs (see page 99) determines the number of times the water will pass through the condenser.

To keep water velocities high in order to obtain good heat transfer rates, each shell size is usually available with two or more boxes since water quantities vary widely. As a general rule, small diameter shells have the greater number of passes to accomplish this design requirement. On large sizes, the shell length may be increased as this has much the same effect as using a water box with a larger number of passes on a short shell. The number of patterns for water boxes on any line of con-

TABLE 3.—SHELL AND TUBE CONDENSER SPECIFICATIONS

Item	Condenser Size Number			
	1	2	3	4
Shell diameter, inches	16	16	18	16
Shell thickness, inches	9/32	9/32	5/16	9/32
Tube length, inches	74¼	74¼	74¼	116½
Overall length, inches	82¼	82¼	82¼	124½
Number of tubes	88	104	128	104
Prime surface, sq ft	86.1	101.8	125.1	162.0
Total surface, sq ft	550.0	650.0	800.0	1034.0
Number of water passes	4 & 8	4 & 8	4 & 8	2 & 4
Connection sizes, inches				
Refrig. gas inlet	3⅛	3⅛	4⅛	4⅛
Refrig. liquid outlet	1⅜	1⅝	1⅝	2⅛
Water inlet—city	2	2	2½	2½
Water outlet—city	2	2	2½	2½
Water inlet—cooling tower	2½	2½	3	3½
Water outlet—cooling tower	2½	2½	3	3½

All condensers use ⅝ inch O. D. copper tubing with .035 inch wall thickness.

All condensers are ASME inspected and stamped.

densers under consideration, however, is always held to a minimum.

Since the advent of finned tube condensers, the space requirement as far as length of tube is concerned, is not much of a problem, since a great amount of capacity can be built into a 10 or 12 ft tube length with a comparatively small shell diameter.

Factors to Remember

In general, when using a manufacturer's rating chart showing a condenser's performance, the following should be kept in mind:

1. The condenser should be selected with comparatively high water velocity through the tubes, since this results in a rapid and efficient heat transfer, reducing the surface required to a minimum.
2. If cooling water is non-scaling and silt free, or if the condenser tubes are cleaned at regular intervals, the .0005 scale factor should be used. (Solid performance lines in rating Figs. 2, 3, 4 and 5.)
3. The water quantity and allowable pressure drop for the particular job will determine the number of passes to use.
4. When selecting a condenser to be used with a specific size compressor, the condensing temperature may be varied somewhat, to get the lowest initial cost combination of compressor and condenser. Cost of the two units is important.
5. For cooling tower water or where water pumping costs are chargeable to the system operating cost, select the condenser with the least number of passes.
6. The higher the condensing temperature, the smaller the quantity of condenser water required. It is, therefore, possible to save water at the expense of power. The reverse is also true.

Example. To demonstrate design procedure, let us assume a problem for which the following conditions prevail:

Condenser capacity = 60 tons refrigeration.
Refrigerant — Freon 12.
Evaporating temperature — 30F.
Condensing temperature — 105F.
Fouling factor — .0005.
Cooling water temperature — 85F.

Solution. From Table 1 we find the heat rejected to the condenser per ton at 30F evaporating temperature and 105F condensing temperature = 248 Btu per minute. Capacity for 60 TR = 248 × 60 TR × 60 minutes = 892,800 Btu per hr. The temperature difference between entering water and condensing temperature is: 105F − 85F = 20F.

Use of the Charts

From condenser capacity charts: enter the curves on Fig. 2 at the heat rejection capacity in thousands of Btu per hr. From this point, move horizontally to the right, to the curve (solid line) representing the temperature difference determined, ie 20F. Read the gpm of water and water pressure drop on the scale shown below. Condenser 1 and 2 will not be adequate since the water velocity through the tubes is excessive. The selection now must be made from size 3. This indicates the need of 158 gpm of 85F water. The water velocity will be 7.3 fps and the water pressure drop 6.6 psi or 6.6 × 2.3 = 15.2 ft, all of which are within reasonable limits.

In order to determine whether or not the best selection has been made, enter the curves on Fig. 2 and find the gpm, water velocity and pressure drop as before. Since the condenser is arranged for 8 passes, the water quantity that may be used without excessive water velocity and pressure drop is limited. Hence, it does not have the required capacity.

If minimum water quantity for the system is desired, the obvious solution would be to go to a higher condensing temperature or to a shell with a greater amount of surface. Select a larger shell by referring to Fig. 4 and enter the chart with a No. 4 size condenser. The figures in this case indicate 160 gpm water required, a pressure drop of about 2 psi and a water velocity of 4.5 fps. The ratings on this chart are for a 2-pass shell, and since the water velocity is low, the pressure drop is less, resulting in a slight decrease in pumping costs, but no saving in water quantity. Figure 5 covers the same size shells with 4-pass heads, and in this instance, with the same method of using the graph the amount of water required is reduced to 130 gpm.

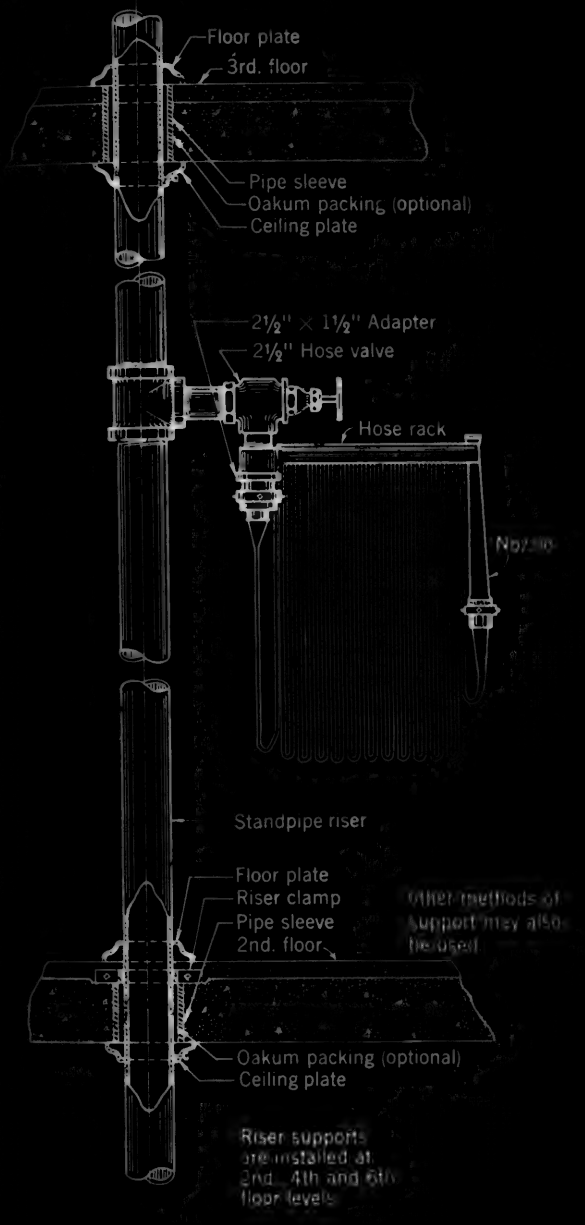
If a higher condensing temperature is used, for instance 110F, the temperature difference between entering water and condensing temperature now becomes 25F.

Where the maximum amount of water saving is required, considering the 110 degree condensing temperature, the No. 3 with 8-pass heads (Fig. 3) condenser will accomplish this saving. The water velocity and pressure drop will slightly exceed the recommended values, but the quantity of water is reduced to 93 gpm or 40 per cent less water than the original selection with 105F condensing temperature.

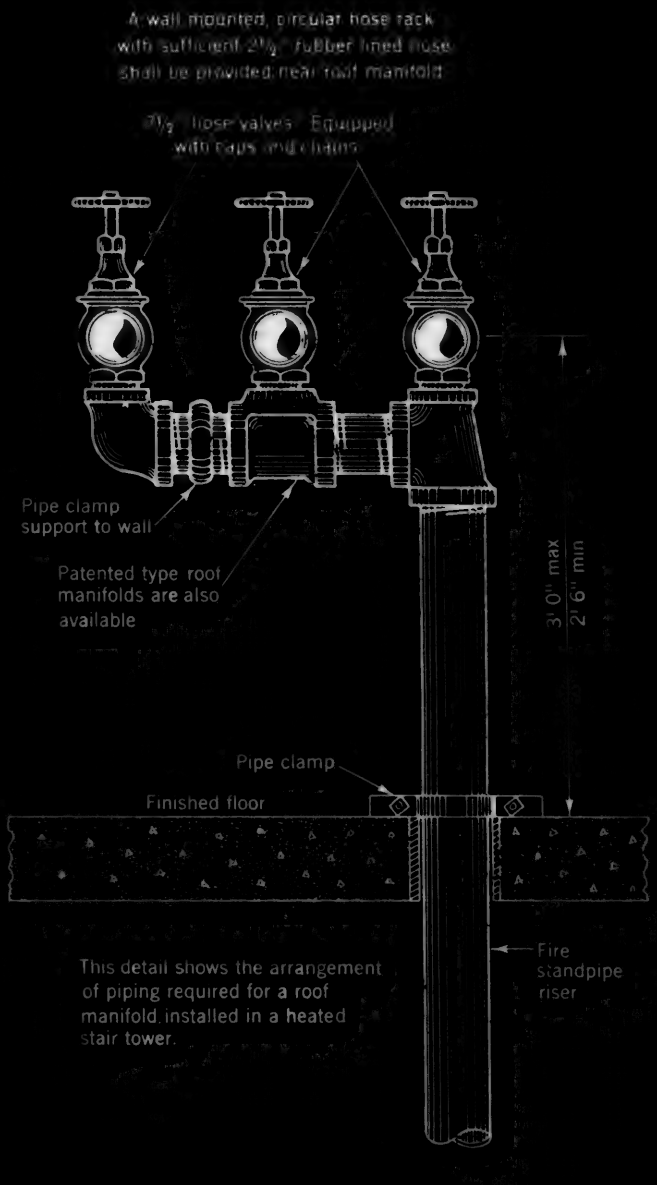
The most economical balance of condenser surface, condensing temperature and water flow quantity, must be determined for each installation, and will vary between installations because of the items of local power and water costs.

A little extra time spent in making several shell selections, and determining which of the preliminary sizes is most suited to the job, will be well worth the extra effort and will result in the installation of an adequate condenser involving a minimum capital expenditure.

DETAILS OF FIRE STANDPIPE RISER



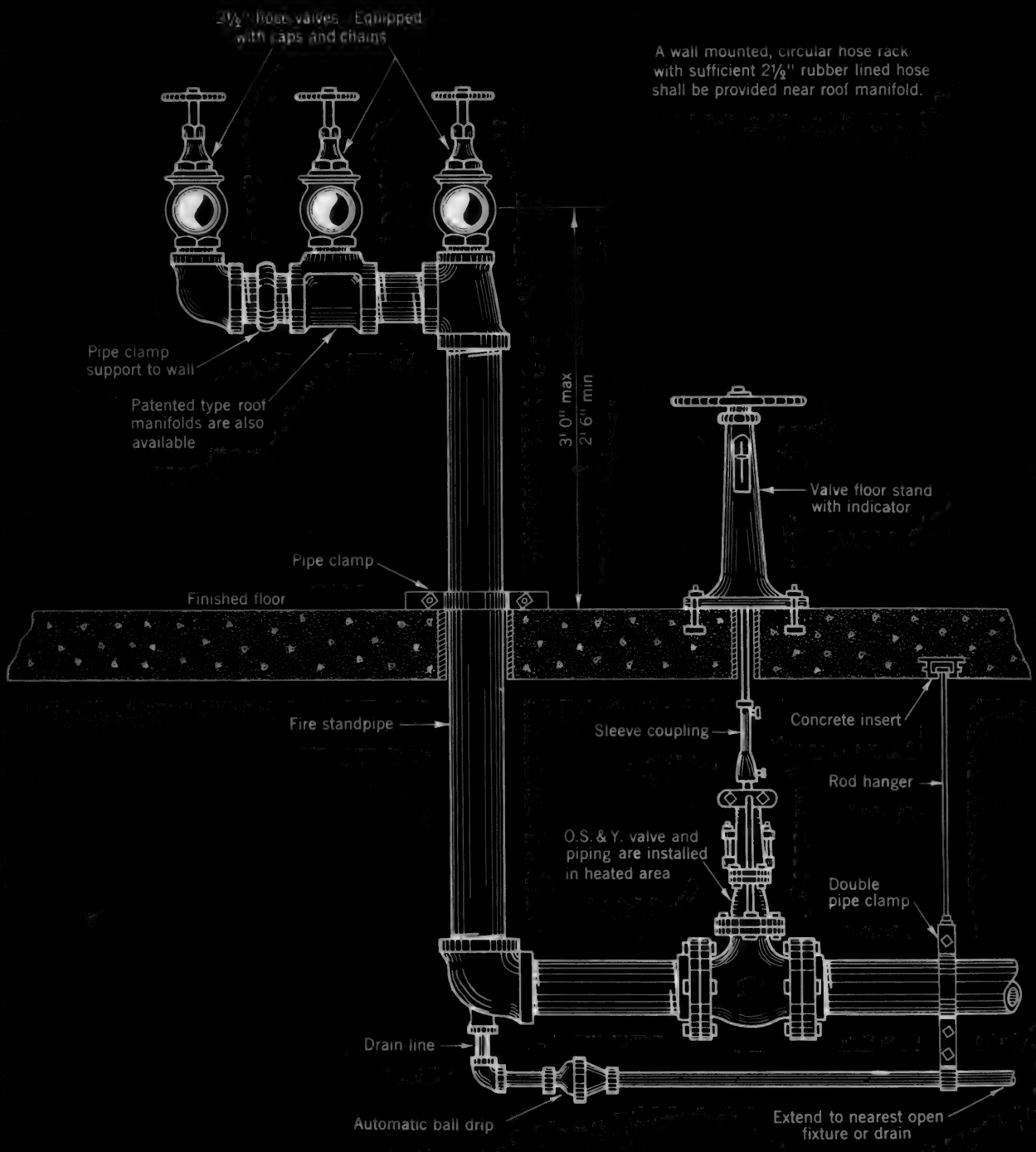
DETAIL OF
TYPICAL HOSE STATION


A wall mounted, circular hose rack with sufficient 2½" rubber lined hose shall be provided near roof manifold
2½" hose valves Equipped with caps and chains
Pipe clamp support to wall
Patented type roof manifolds are also available
3'0" max
2'6" min
Pipe clamp
Finished floor
This detail shows the arrangement of piping required for a roof manifold installed in a heated stair tower.
Fire standpipe riser

ROOF MANIFOLD
FOR A STANDPIPE RISER

HEATING AND VENTILATING'S DETAIL SHEET

DETAILS OF FIRE STANDPIPE RISER


2½" hose valves Equipped with caps and chains
A wall mounted, circular hose rack with sufficient 2½" rubber lined hose shall be provided near roof manifold.
Pipe clamp support to wall
Patented type roof manifolds are also available
3' 0" max
2' 6" min
Valve floor stand with indicator
Pipe clamp
Finished floor
Fire standpipe
Sleeve coupling
Concrete insert
Rod hanger
O.S. & Y. valve and piping are installed in heated area
Double pipe clamp
Drain line
Automatic ball drip
Extend to nearest open fixture or drain

ROOF MANIFOLD INSTALLED IN AN UNHEATED STAIR TOWER

DETAILS COURTESY, LOUIS BLENDERMANN, ENGINEER
GLEN COVE, N. Y.

HEATING AND VENTILATING'S DETAIL SHEET

Louis Blendermann on

PIPING and PLUMBING

Footing Drains Around Buildings

OCCASIONALLY, the site conditions for a proposed project are such that the building, by nature of the ground contour, will be located in a low or depressed area where surface water accumulation during a rainstorm presents a serious problem for the foundation wall and the earth support for the footings. Since this is a matter of grave concern to the structural engineer, he usually requests that a system of subsoil drainage piping be installed to prevent damage from accumulated water. The proper design of such a system then becomes the responsibility of the engineer designing the plumbing work.

Subsoil drainage systems have varied applications. In this article we shall consider only the system that may be used successfuly for a condition similar to that previously mentioned—a system generally referred to as footing drains. These footing drains are designed to intercept the surface water before it can reach the foundation wall or earth support under the footings, and to conduct this water to a suitable point of discharge. A typical system of footing drains with cleanouts and sand interceptor is shown in Fig. 1.

Footing drains, illustrated in Fig. 1, are installed around the perimeter of the building. The water is conducted to the sand interceptor and then to the point of discharge which in this case is assumed to be a storm water drainage line from the building. The system includes the drainage piping, cleanouts and a sand interceptor, each of which has an important role in the satisfactory operation of the system.

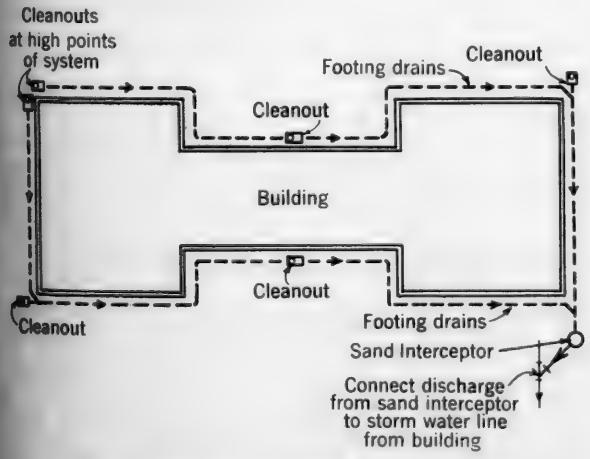


Fig. 1. Layout of a footing drainage system.

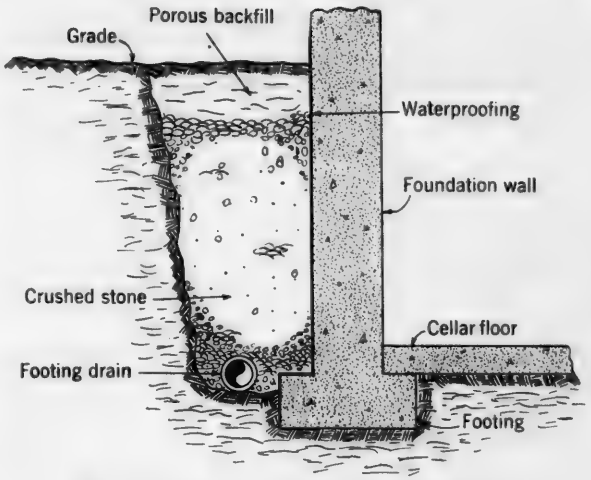


Fig. 2. Detail of a footing drain installation.

Although there are several different piping arrangements that may be used with this system, the arrangement shown in Fig. 1, is basic and serves as the example in this case. We will discuss the function and installation of the component parts of the footing drainage system shown.

Installation of Footing Drains

Clay pipe or porous concrete pipe is used for footing drains of which the clay pipe is more generally used. Clay pipe is available in two to three-foot lengths and 4-inch diameter is the size usually selected for a system of this type. The piping is also obtainable in regular lengths or in lengths that are fully perforated or partially perforated.

As indicated in Fig. 2, the drainage line is installed near but above the bottom of the footing. If regular piping is used, a covering of tar paper or other manufactured material available for this purpose, is placed over the open joints to prevent sand or earth from entering the line. If perforated piping is used, it is of the partially perforated type with the perforations set at the bottom of the line. Since water will follow the easiest path, it will flow through the drainage piping to the point of discharge. A firm bed of crushed stone is placed under the piping for support. Crushed stone is also placed around and above the piping to facilitate easy drainage. In addition, the piping is installed with a slope of approximately

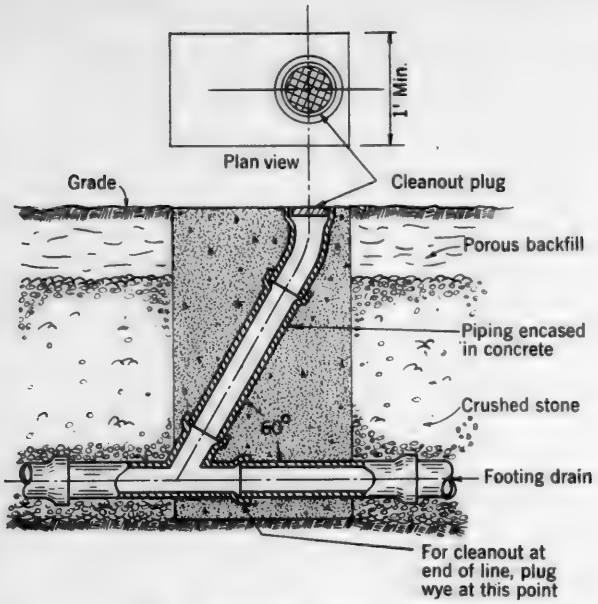


Fig. 3. Detail of a typical cleanout.

one inch to every 25 feet, toward the sand interceptor. For extra long runs of piping, the slope may be even less than this figure.

It is important to mention that consideration be given to the area around the building to the extent that area drains be provided to draw away as much as possible of the surface water. Area drains will lessen the load otherwise placed on the footing drains. It is good practice to slope the grade away from the building as this prevents heavy concentrations of water over the drainage trench and allows for a more natural seepage of water to the footing drains.

The system shown in Fig. 2 is intended only for the drainage of surface water seepage and is not intended for the drainage of a ground water condition. The system required for a ground water condition is a different problem and will be discussed in one of the later articles.

In brief, the drainage trench and piping functions as though it were an open trench around the building which would intercept the surface water and surface water seepage before it could reach the building, and conduct it to a suitable point of discharge.

Cleanouts

A system of footing drains, like any other system of drainage piping, should be equipped with cleanouts to allow for the clearing of any stoppages that would tend to interfere with the flow of water through the system. Cleanouts for this system have an important part in the proper operation of the system and they should be placed at the ends or high points of the system and in other locations which provide for easy access to the entire system. A typical detail of a cleanout is shown in Fig. 3.

Although other types of cleanouts are often installed for this purpose, the cleanout shown has been chosen to illustrate this installation. As indicated, the top of the cleanout has been installed flush with the grade with a plug arranged for easy removal. The cleanout piping is encased in concrete to keep the cleanout in place and to prevent an unbalanced weight or strain on the drainage piping. During the normal operation of the system, small amounts of sand or earth will settle in the pipe, despite the preventative steps taken. The accumulation of such material will eventually impede the flow of water through the pipe. To clear the pipe of this material, it is only necessary to remove the cleanout plug and insert a water hose. By applying a gentle flow of water to the system, the sand and earth will be flushed through the system to the sand interceptor. The cleanout is also useful in locating obstructions in the system.

Part of the system may become blocked to the extent that the water will not drain or is slow in draining, due to severe settling of part of the piping, or a heavy concentration of earth material, or even a growth of tree roots in a part of the system. By running water into one cleanout at a time, and by checking the flow into the sand interceptor, the faulty part of the system can be quickly located and dug up if necessary. Bushes or shrubs that develop deep and fine roots should be avoided directly over or near the drainage pipe.

Sand Interceptor

The sand interceptor is a necessary component of the system because, as its name implies, it intercepts and retains the sand or earth carried in suspension by the water passing through the system. It prevents any sand or earth from entering the outside storm water drainage line into which this system empties. Deposits of earth materials may be periodically removed through the top.

The sand interceptor, Fig. 4, is constructed of concrete, although it may also be of cast iron or steel of which several patented types are available. This particular type of sand interceptor was illustrated because it also serves as a cleanout manhole for the piping between the interceptor and the storm water line. Water containing small quantities of sand or earth in suspension flows into the interceptor. Since there is no turbulence problem in the interceptor, this material will settle rather quickly and only clear water will be discharged into the storm water line. Often baffles are placed in the interceptor to assure positive separation of the earth material and the water. However, the construction of the particular type of sand interceptor and the use of baffles are individual design

(*Concluded on page* 157)

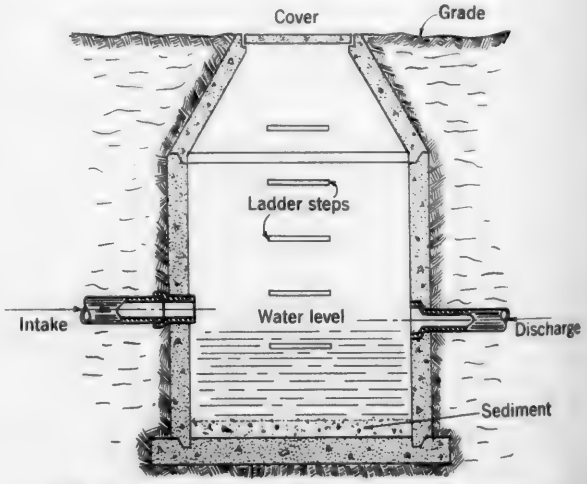


Fig. 4. Section through a typical sand interceptor.

PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Conducted by WM. B. FOXHALL, Associate Editor

17 Heat Pumps Condition Shoe Factory

PROBLEM: The Virginia Shoe Company of Fredericksburg, Va., employs about 300 people in a one story insulated cinder block building. In order to keep hides in workable condition and to maintain comfort for employees in a region were summer design conditions are 95F dry bulb and 78F wet bulb, the management decided to install air conditioning. A widely varying load imposed by resistance heaters used for glueing and drying operations and some 132 fractional horsepower motors used in company machines made individual zone control necessary.

SOLUTION: Seventeen 5-ton General Electric Weathertron heat pump units were installed at intervals along outside walls. To meet the zoning requirement, each heat pump has its own thermostatic controls which automatically adjust its performance to actual needs of the area it serves. Total installed cooling capacity is 85 tons of refrigeration. Short ducts bridge a 5-inch space between each machine and the outside wall to supply each unit with outdoor air. In winter, heat pumps extract heat from outdoor air and in summer they reverse themselves to extract heat from indoor air and pump it outside. No water is used in these operations.

RESULTS: The local utility estimated the annual cost for heating and cooling to be about $2500, a 30% advantage over a conventional fuel fired system. This advantage is due in part to the all electric nature of the factory. The Fredericksburg plant is said to be one of the first truly all-electric factories in the world. Hides used in shoes are easier to work in a controlled atmosphere and a product of more consistent quality is possible.

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54 Fans Ventilate Gateway Center

PROBLEM: Moving over 1½ million cubic feet of air every minute through the three buildings of Pittsburgh's new Gateway Center is necessary to provide year round air conditioning and ventilation comfort for tenants who occupy the 940,000 square feet of rentable space.

SOLUTION: The air moving job is handled by 54 major fans built by Westinghouse Electric Corp., Sturtevant Division at Hyde Park, Mass. Each building has ten main air supply fans and eight major exhaust fans in addition to a number of supplementary heating and ventilating fans. The fans range in size from a little over 1 foot high to some with housings 13 feet high. The smallest is driven by a 1/6 hp motor and the largest by a 75 hp motor. Each building is serviced by 8 complete air conditioning systems. Two primary and two secondary systems including intake and exhaust vents are located on each roof. These are housed in penthouses and service the upper floors. Two similar systems are located in each basement to condition air supply to the lower floors. Exhaust and supply vents for the underground restaurant and kitchen are 2 marble-covered pylons, 25 feet high marking a gateway to the grounds. Twelve additional Sturtevant air handling units, independent of the building's system, ventilate the large underground garage. Some of these units send cooled or heated fresh air into the garage, while others exhaust foul air and prevent the accumulation of noxious gases.

RESULTS: Three stainless steel covered buildings, one 24 stories high and two 20 stories each, are completely air conditioned while exhaust and intake vents are integrated with the architectural concept of the whole group.

Plastic Pipe Serves Lake Resort

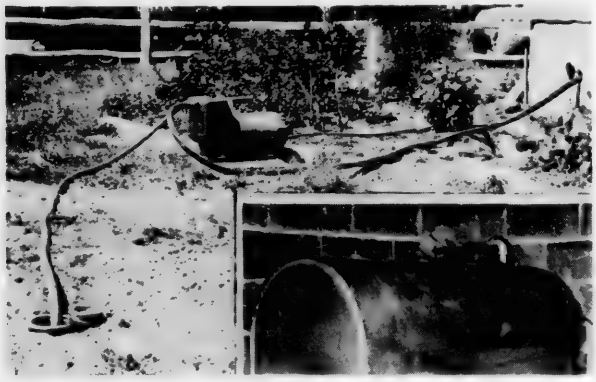
PROBLEM: At the Prince Lake development in Indiana, installation of a modern water system including a filtration plant and numerous large storage tanks was complicated by hilly terrain and the need to cross a large lake with the water supply system.

SOLUTION: Use of plastic pipe manufactured by Crescent Plastics, Inc., of Evansville, Ind., proved to be the only feasible means of installing this system. Because smoother plastic pipe eases flow restriction, smaller sizes could be used. Flexibility of plastic pipe allowed proper seating on the bottom of much narrower ditches without the requirement that ditch floors be level. Plastic could be strung directly across the lake and anchored instead of going miles around. A 2-inch plastic pipe line was also used to supply water from the Prince Lake system to a town 1 mile north of the lake where low water table had required that schools operate on a 2 to 3 day week. As water is pumped from the reservoir to the Prince Lake plant, alum is added. This coagulates and settles in the sediment pit. Clean top water spills into a 15-foot filtering bed of sand and gravel. From there it is channeled into the underground storage area. Booster tanks assure adequate volume at equalized pressures.

RESULTS: Cost of the system was about half of the estimated cost of laying metal pipe for the same system. Also, maintenance costs were reduced.

Small Pump Simplifies Tank Changes

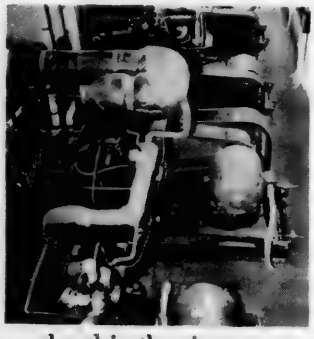
PROBLEM: A client of the Bolkema Fuel Co., Ridgewood, N. J., had a leak in a 275-gallon tank. He wished to eliminate this tank in favor of a safer and larger 550-gallon outside tank. After the outside tank was installed, there remained the problem of transferring almost 200 gallons of fuel from the inside tank to the outside tank.



SOLUTION: Connections were made between a pump and the two tanks with oil resistant ¾-inch garden hose. A Marlow Gem, a new self-priming centrifugal pump powered by a ¼-hp motor, was used to pump the fuel.
RESULTS: Pumping at a rate of almost 7 gpm, the oil transfer was completed in a half-hour. It was not necessary to tie up a tank truck and pump to make the transfer.

Environmental Laboratory Has 12 Chambers

PROBLEM: The Sperry Gyroscope Company recently constructed a new Environmental Test Laboratory, consisting of a dozen chambers equipped with devices for subjecting electronic products to varying conditions of atmospheric pressure, temperature, humidity, shock, vibration, and corrosion or contamination from sand, dust, and salt. The temperature range required in these test chambers extends from —100F to +200F with relative humidities from 20% to 95%.



SOLUTION: Refrigeration is accomplished by 14 Eclipse compressors manufactured by Frick Company of Waynesboro, Pa. The compressors are arranged for multi-stage compression under automatic control. Electrical resistance heater elements are placed in the air stream to provide the higher temperatures. Humidity conditions are varied by a wet-bulb control regulating the amount of water available to the air stream.
RESULTS: Once the desired atmospheric characteristics are set up on a central control panel, automatic controls maintain them with negligible variation, depending upon the amount of heat generated by the equipment being tested.

Computer Requires Constant Atmosphere

PROBLEM: At Johnsville, Pennsylvania, the Navy operates a giant $2 million electronic computer known as the Typhoon, currently used in making three-dimensional flight studies of aircraft and missiles. The Typhoon is said to have a human-like susceptibility to heat and humidity such that the slightest change will throw calculations off.

SOLUTION: To guard against this, electronic recording instruments developed by Minneapolis-Honeywell Regulator Co. have been installed. These devices record changes in temperature and humidity and sound an alarm when changes exceed certain limits. Then steps are taken to cool off the computer.

RESULTS: Accuracy of computations is assured by maintenance of a constant temperature and humidity in the atmosphere surrounding an electronic computer.

Conditioned Cab Keeps Crane Moving

PROBLEM: At the Cicero, Ill. plant of Taylor Forge & Pipe Works, heat from forging processes imposed a severe burden on traveling crane operators. Temperatures in the forging areas may be 140 to 160 F and even higher when the ovens are open to remove heated forgings, and conditions in the crane cab became intollerable.

SOLUTION: To alleviate this condition, Taylor Forge has installed a Dravo crane cab conditioning unit on the crane serving this area. Installation of the unit was simplified by the fact that the cab had already been enclosed as a means of cutting down both the heat load and as a protection for the operator against oil and gas fumes which constantly arose from the process.

The unit has a 3-ton cooling capacity with continuous ventilation providing for removal of dust, dirt, gas, fume and odors. It is a completely self-contained unit using air for condensing purposes. The conditioner is mounted on top of the cab and a duct run from the unit into the back wall of the cab. Return air is drawn from the floor and ducted to the unit. The supply air is processed through a bank of conventional filters and activated carbon filters and is then cooled prior to being returned to the cab. A sufficient quantity of make up air is provided by cab infiltration. Temperature in the cab is maintained between 75 and 80 F.

RESULTS: According to the Taylor Forge plant engineer, it is doubtful if present production schedules could be maintained without the cab cooling equipment. By conditioning the crane cab, it is possible to increase the heat load in the area without worrying about the effect it might have on the operator.

What Would You Do?

Replies to engineering and operating problems of interest to the industrial plant engineer

Conducted by
NATHAN N. WOLPERT
Associate Editor

CONDENSATION of moisture on window glass is a problem that has been given considerable study because of the large number of buildings and stores that are affected during winter months. Data have been made available in easy-to-use form so that calculations are not necessary.

Should you have a problem that you would like to see treated in this department, or if you have some comments that you would like to make regarding the problem scheduled for the next issue, you are invited to write to the Editor.

This Month's Problem

My company's plant is located on a street that has good traffic throughout the day. It has been suggested that we install a small window and platform on which to display company products. I would appreciate some information as to what conditions will produce condensation on the proposed window so that inside conditions can be checked.

This Month's Problem

Moisture condensation on show windows is the result of the air enclosed in the window display area having water vapor as a constituent of the air. This vapor usually occurs in the form of superheated steam, but when the air comes in contact with a surface cold enough to be below the dew point of the air, moisture will condense on the cold surface. For this reason, if the inside surface temperature of a window is below the dew point temperature of the inside air, moisture condensation is likely to occur on the window. To be sure that moisture condensation does not take place, the inside surface temperature of the window should not be less than the dew point temperature at the existing conditions of inside temperature and relative humidity.

It is necessary to be able to show just when moisture condensation can be expected for a particular outside temperature and for any temperature existing inside the window display area and therefore the curves of Fig. 1 were drawn. These curves were determined mathematically and they are based on the following two initial assumptions:

(1) Outside wind velocity, 15 mph; inside air equal to still air.

(2) The window consists of a plate glass pane having a coefficient of heat transmission for U that is equal to 1.03.

As an example as to the use of these curves, suppose

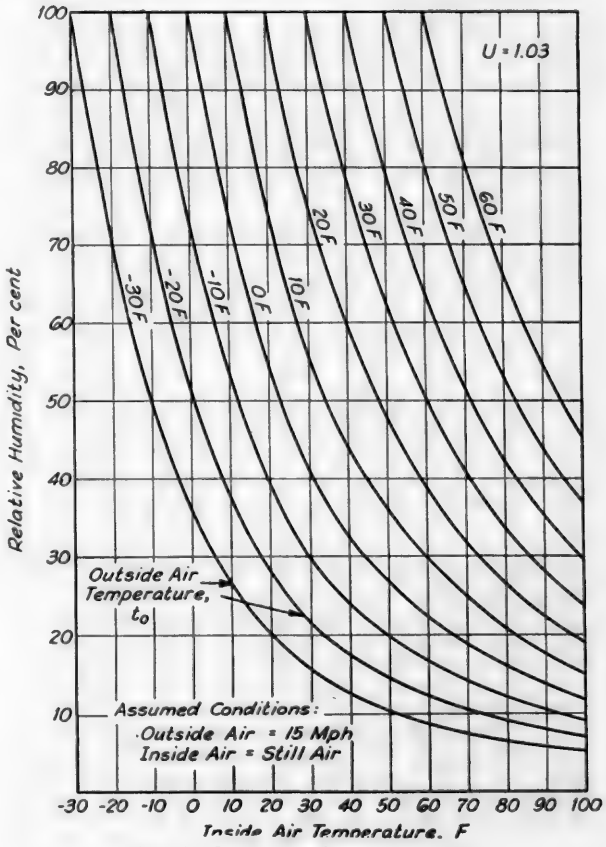


Fig. 1. Conditions for condensation

that in the city of Chicago, Ill., where the design dry bulb temperature for the winter months is −10F, a show window display area has a normal average temperature of 58F. From the curve for $t_o = -10$F, it is seen that the maximum allowable relative humidity is 17 per cent at the inside temperature of 58F. On the other hand, if the outside temperature should rise to 30F, the allowable relative humidity would be 52 per cent.

T. L. Gershun

Other Data

The problem of moisture condensation on window glass has been studied by the National Warm Air Heating and Air Conditioning Associaton. As a result, a table was prepared for varous types of windows, outside air temperatures and for humidity limits of 70F inside air. Values

TABLE 1—INSIDE WINDOW SURFACE TEMPERATURES AND HUMIDITY LIMITS OF 70F AIR.

U Value of Glass	Type of Window				Outside Air Temperature, Degrees F									
	No. Glass Panes	No. Air Spaces	Type of Air Space Between Panes	Air Space Width, Inches	—30	—20	—10	0	10	20	30	40	50	60
					In each pair of values below, the upper one is the temperature in degrees F of the inner surface of the glass and the lower one is the relative humidity of 70-deg room air above which condensation may be expected to form on the glass.									
1.13	1	None	....	....	—6 2%	2 5%	9 8%	17 12%	25 18%	32 24%	40 32%	47 43%	55 58%	62 75%
0.75	2	1	Note 1	1½	20 14%	25 18%	30 22%	35 27%	40 32%	45 40%	50 48%	55 58%	60 70%	65 84%
0.63	2	1	Sealed Note 3	¼	28 20%	32 24%	36 28%	40 32%	45 40%	49 47%	53 54%	57 63%	62 75%	66 87%
0.57	2	1	Sealed Note 3	½	32 24%	36 28%	39 30%	43 37%	47 43%	51 50%	55 58%	59 68%	62 75%	66 87%
0.45	2	1	Note 2	1½	40 32%	43 37%	46 41%	49 47%	52 52%	55 58%	58 65%	61 72%	64 81%	67 90%
0.43	3	2	Sealed Note 3	¼	42 36%	44 39%	47 43%	50 48%	53 54%	56 60%	59 68%	61 72%	64 81%	67 90%
0.38	3	2	Sealed Note 3	½	44 39%	47 43%	50 48%	52 52%	55 58%	57 63%	60 70%	62 75%	65 84%	67 90%

Note 1. Window with usual storm sash.
Note 2. Windows with very tightly fitted storm sash and no ventilator openings in sash.
Note 3. Windows with two or three glass panes hermetically sealed in the sash to prevent air leakage into spaces between panes.

of inside surface temperatures were calculated from the formula:

$$t_s = 70 - \frac{U}{1.5}(70 - t_o)$$

where t_s = temperature of inner surface of glass, F
70 = room air temperature, F
U = heat transmission coefficient of window, Btu per (sq ft) (hr) (F)
1.5 = surface coefficient of glass under still air conditions, Btu per (sq ft) (hr) (F)
t_o = outside air temperature, F

Table 1 gives values for single windows and for multiple windows with different air space.

Answer to Previous Problem

The following letter is in reply to the problem published in the September issue regarding proper relative humidity to be mantained in an assembly room where women are seated working with small electrical parts for an electronic unit.

The most desirable percentage of relative humidity to be maintained in a space where electronics parts are manufactured or assembled depends upon (1) the material being used, (2) moisture content of the material, (3) allowable variation in inductance, capacity and tolerance, due to moisture changes in the finished product, and (4) other similar conditions. The worst enemy of electronic parts manufacture is *bound moisture* and *capillary flow*. In the former, moisture is sealed within the part and an example is inductance coil or transformer winding; in the latter, moisture creeps into the part by liquid-solid molecular attraction due to faulty sealing or processing. Either of these results in undesirable variations in inductance, shrinkage and breakage, deterioration, and in some cases overheating or burnout. An inductance coil, for instance, should be assembled in as dry a condition as possible and thoroughly sealed to prevent capillary flow of moisture. Materials used in coil construction normally contain a certain amount of moisture, although they appear perfectly dry to the touch and sight during construction. This assumes, of course, that no drying or dehumidification has been accomplished. The term "coil" is used broadly and includes chokes, relays, transformers and resistors.

Electronics parts materials should be process dried prior

(*Concluded on page* 154)

Problem for the Next Issue

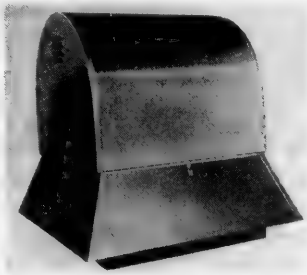
I am trying to obtain figures used by piping designers which would give the water demand for various plumbing fixtures installed in a factory. This information should cover both the water demand for fixtures installed singly and in groups.

NEWS OF EQUIPMENT AND MATERIALS

Use the handy prepaid postcard, page 130, for securing additional information on items described in this department.

Addition to Ventilator Line

The addition of a Model B series of power roof ventilators to its present line of these products is announced by W. R. Carnes Co., Verona, Wis. The ventilator is available in wheel sizes from 12 to 60 inches, and will handle requirements from 1000 to 3800 cfm. The 12-inch unit is a direct motor driven unit, while the sizes of 15-inch and larger units are belt driven to secure practically any cfm output desired.



All aluminum as well as galvanized steel construction is featured as standard equipment. Copper construction is available on special order. All units have a precision balanced, backwardly inclined centrifugal fan wheel, which is available in non-sparking aluminum, steel or copper. The motor hood is hinged for easy access to the drive and the motor is isolated out of the air stream.

Available accessories include a full line of automatic and motorized dampers, bird screens, and extended curbs. The extended curbs are designed with a large access door and a slide for installing either automatic or motorized dampers.

More information? Circle Item 1 on postcard, page 130

Hot Water Controls

New hot water limit controls featuring a universal contact structure which handles all voltages from millivolts to 230 volts are introduced by White-Rodgers Electric Co., St. Louis, Mo. These limit controls are also available in combination with circulator or low limit controls, housed in a single compact case.

The dual controls feature new sensitive elements in which two bulbs of half-round design are contained in a single well in such a way that they fit snugly against each other and against the sides of the well. As there is no dead air space in the well, these controls give rapid response to changes in water temperature. Housed in one case, the two controls perform three jobs, including limit protection, circulator control and low-limit for operating the burner.

More information? Circle Item 2 on postcard, page 130

New Line of Circular Diffusers

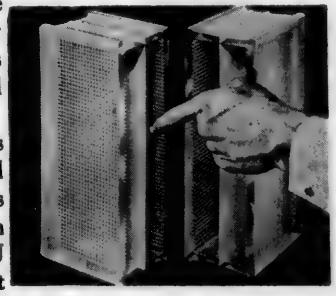
A series of adjustable and non-adjustable circular diffusers is being marketed by Air Devices Inc., New York, N. Y. The adjustable units have built-in segmentized air controllers which produce any angle of air discharge from above horizontal to vertical without disturbing relative position of the spinnings.

Four 90 deg segments, independently adjustable, permit horizontal blows from one segment, vertical from a second, 45 deg downward from a third and 20 deg from a fourth if desired. Intermediate angles of discharge are maintained with or without ceiling effect. All adjustments can be made after installation. Aluminum spinnings are designed with extremely wide outer flange which overcomes inaccuracies in plaster openings and minimizes need for smudge rings. Bulletin C-100 is available.

More information? Circle Item 3 on postcard, page 130

Glass Blocks Cut Heat, Glare

An addition to its line of double-cavity glass blocks for exterior walls and roofs is announced by Pittsburgh Corning Corp., Pittsburgh, Pa. Known as Suntrol, these hollow glass blocks have a pale green fibrous glass filter sealed into their centers to reduce the glare and heat of the sun.



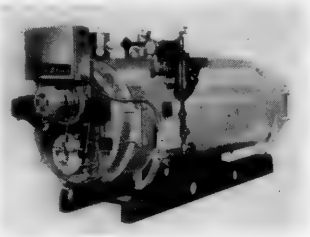
The denseness of this screen plus the partial vacuums in the blocks provide good illumination with high insulation (U value 0.44). The light green filter has the additional effect of making people feel cooler and more relaxed under extreme sunlight conditions. Light directing patterns throw light upward toward the ceiling where it is reflected into all parts of the room; light diffusing patterns distribute light in all directions; and special skylighting blocks spread even, comfortable lighting over wide floor areas.

The manufacturer states that these functional glass blocks offer advantages in building modernization and construction, such as reduction of both heating and air-conditioning expenses, and saving in illuminating costs, particularly through use of skylighting. Their durability and impact resistance hold replacement costs to a minimum and afford protection against burglary and vandalism. They are easy to clean and require little maintenance. In addition to the functional blocks there are a variety of patterns for decorative and interior use as walls, office enclosures and area dividers.

More information? Circle Item 4 on postcard, page 130

Combination Oil-Gas Burner

The establishment of manufacturing arrangements with Canada to manufacturer the first sizes of its new CB boiler line there, is announced by Cleaver-Brooks Co., Milwaukee, Wis. Gas or combination oil-gas burner equipment in 30 and 40 hp sizes will be available to Canadian customers to take advantage of the availability of gas fuel.



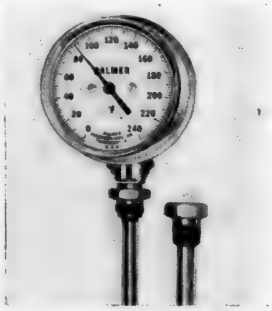
A complete ready to operate boiler-burner unit, it features quiet operation, fuel economy, electronic combustion safety controls, four-pass fire-tube construction with five square feet of heating surface per boiler, and a guaranteed minimum efficiency of 80%.

More information? Circle Item 5 on postcard, page 130

Improved Dial Thermometer

An improved 3½-inch dial thermometer, No. 35-S, is placed on the market by Palmer Thermometers, Inc., Cincinnati, Ohio.

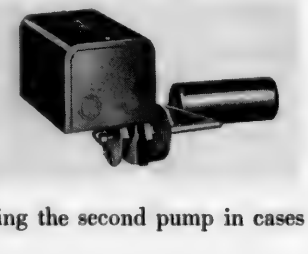
This mercury actuated dial thermometer features external calibration. Other features include the stainless steel case which has a clear plastic face covering, and the gasket sealed to the stainless steel back plate. The dial face is a full 3½ inches with large black numerals and degree marks on white background for easy reading at long range. The dial case can be rotated to any readable position. The actuation is by direct-drive Bourdon coil, no sector, pinion, or linkage. The stem is ½-inch in diameter and has a stainless steel bulb of standard lengths (4, 6, 8, and 12 inches). The fittings consist of separable sockets, union connections, and flanged union.



More information? Circle Item 6 on postcard, page 130

Condensate Pump Alternator

A screw-in tank alternator for condensate pumps has been designed by Square D Co., Milwaukee, Wis. It provides a simple, positive means of mechanically alternating the operation of two pumps installed in a duplex system with a common tank. The function of this control is to provide alternate cycles of operation to insure even wear of the pumping units. It thus eliminates the evils of long standby for one of the two pumps. The alternator further provides the additional function of starting the second pump in cases where extra capacity under peak conditions is required.



The new Class 9038 CG alternator is interchangeable in tank mounting with the veteran Class 9037 Type HG screw-in tank float switch, affording simple conversion to duplex pumps. The flexibility of the switch reduces the stocking problem to a minimum. It is possible to change the float position from the right to the left hand side or vice versa. Contacts may be converted to either open or close on liquid rise. Without removing the switch from an installation, float travel may be adjusted in the field, within limits, by loosening two screws and moving the float stops to the desired position. A float position indicator and indicating dial aid in obtaining the proper settings. The switch will function properly under a pressure of 50 pounds per square inch.

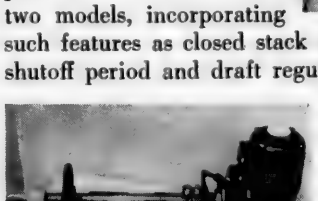
Switches are available for 110, 220, 440, and 550 volts. The structure consists of two 2-pole, double break, silver-to-silver, visible and vertical contact mechanisms. It is of the positive snap action toggle type, assuring operation under conditions of liquid turbulence. All parts have corrosion resistant finish. The immersed working parts are entirely of brass, copper, or stainless steel. The enclosure consists of a steel frame with a slip-on steel cover finished in blue-gray enamel and built to NEMA I specifications. A watertight seal is insured by a graphite coated asbestos, used in the stuffing box.

More information? Circle Item 7 on postcard, page 130

Overfire Damper Control

An electrically operated damper control to regulate overfire draft in a boiler combustion chamber fired by fully automatic oil, gas or coal burning equipment is being manufactured by The Nichols Instruments Co., Baltimore, Md.

Called the Fuel Saver Damper Control (upper photo), it is available in two models, incorporating such features as closed stack damper during the burner shutoff period and draft regulated to plus or minus .01 inch w.g. during operation. The type AAP, one of the two models offered, may be used universally to control draft. The type AALP, adapted for use with induced draft, features a low draft limit switch to insure shutoff of burner equipment if draft drops below an adjustable minimum. Installation of a fan interlock switch is eliminated by this ready-wired circuit. An adjustment of the control also provides the most desirable draft for burner startup, thus eliminating flame failure and puffback caused by excessive drafts.



The power unit (lower photo) is rated to overcome a torque of about 500 inch pounds, and is designed to move dampers readily, even after dirt accumulations have greatly increased their drag.

More information? Circle Item 8 on postcard, page 130

Refrigerant Filter and Drier

An improved refrigerant filter and drier unit is placed on the market by A-P Controls Corp., Milwaukee, Wis. The manufacturer states that the new unit, called the Trap-Dri, eliminates corrosion and dirt problems created in the refrigeration system by absorbing harmful acids, providing depth filtration, preventing chemical reaction in the system, and operating at no appreciable pressure drop.

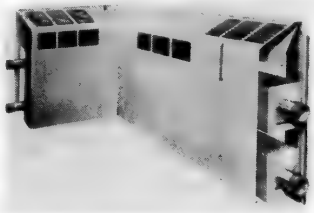
The unit features a new refrigeration grade silica gel dessicant which protects refrigerating systems against the harmful moisture effects of freezeups, corrosion, and copperplating in the system. Incorporated in the drier are double seal plastic caps which prevent any dirt or moisture entering the new drier preceding installation. Silver-solder seal of the 2-piece body shell prevents leaking joints. Other features are large wrench-grip inlet and outlet fittings and a new special copper-paint finish which protects against external surface corrosion. Flare type or solder type connections are available.

The unit will withstand over 2000 lb bursting pressure.

More information? Circle Item 9 on postcard, page 130

Wall Radiator Has Sloping Top

Wall radiation featuring a newly-designed sloping top cover with openings both top and front is available from Union Asbestos & Rubber Co., Chicago, Ill.



The one piece metal cover is available in lengths up to 20 ft, and is produced with openings at both the top and front of the cover or with either top or front louvers alone. It can be ordered in one, two, or three high elements, with either a sloping or flat top cover. The finned tube elements provide for the use of either hot water or steam. A newly-designed wall plate supports the cover and elements allowing for quick installation. If desired, the covers can be supplied with a galvanized coating in place of the standard phosphitized gray primed finish.

More information? Circle Item 10 on postcard, page 130

Automatic Control System

Additional safety in the operation of gas-fired water heaters is the aim of a newly-developed, self-powered automatic control system produced by General Controls Co., Glendale, Calif.

Known as the Dual-Safe Control System, it operates as two separate and independent systems. In the event of abnormally high temperature, both a thermostatic valve and a thermomagnetic valve close to shut off the gas. The system provides 100% shutoff of gas upon pilot flame failure or overheating of the tank. In addition, the unit handles automatic temperature control, fail-safe pilot operation and gives safety protection during the pilot lighting procedure.

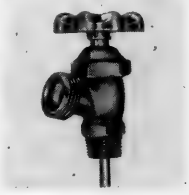
Three main components make up the system. They are a high temperature limit switch, a thermomagnetic safety valve and a 250 millivolt pilot generator. At the heart of the system are the company's G-2 and G-5 series water heater controls. These are all-in-one safety, temperature and flow control types. Accurate water temperatures are maintained automatically with them. The temperature limit switch is surface mounted at the top of the water heater tank. This switch is furnished with armored cable leads and bushing connector to simplify installation. No extra gas piping is required for the unit.

The system is powered by the G-250 pilot generator, which is adaptable to standard single couple pilot burners without any change in bracketing. The G-250 provides sufficient voltage to handle the extra wiring and limit control.

More information? Circle Item 11 on postcard, page 130

Valve Recharges Tanks

A low cost valve for quickly recharging waterlogged compression tanks is announced by Bell & Gossett Co., Morton Grove, Ill.



The design of the valve is simple. A feature of the valve design makes it virtually impossible to waterlog an expansion tank except by loss of air from a leaky tank or normal air absorption into the water itself.

The valve is ½-inch size and has a standard ¾-inch hose connection for a drain.

More information? Circle Item 12 on postcard, page 130

Steel Clamp Added to Line

The addition of a new stainless steel Sure-Tite clamp with Wittek Worm Drive (WWD) design to its regular line is announced by Wittek Mfg. Co., Chicago, Ill. The manufacturer states that the clamp, originally designed for the aircraft industry, is now being made available for a wide variety of automotive and industrial applications.

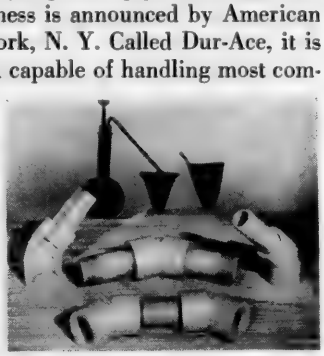
The clamp is detachable and can be applied quickly to hose which is already in position. The one-piece hardened screw is deep slotted and will accommodate any size screwdriver. No special tool is required. The housing is of one-piece design, and enclosed to permit the proper band width and flexibility for leakproof sealing.

Manufactured in a complete range of sizes, these clamps are packaged ten to a carton. They are also available in a fifty-clamp counter display package.

More information? Circle Item 13 on postcard, page 130

Plastic Pipe Resists Corrosion

A corrosion-resistant, rigid plastic pipe with high impact resistance and toughness is announced by American Hard Rubber Co., New York, N. Y. Called Dur-Ace, it is a general-purpose material capable of handling most common corrosives.



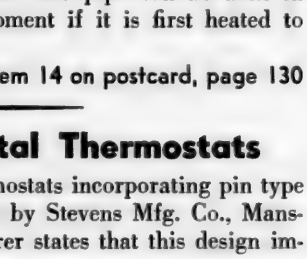
In addition to its high impact resistance, the material is light in weight, odorless, tasteless, and non-contaminating. It has excellent resistance to all inorganic acids and alkalis with exception of a few strong acids. Though satisfactory for petroleum products generally, it has limited resistance to organic solvents. Moisture absorption rate is low. It maintains good strength, rigidity and chemical resistance over a temperature range of from minus 40 deg F to 170 deg F. The manufacturer states that electrolytic corrosion, bacteria, and fungus have no effect on the material, hence it is excellent for many outdoor applications such as buried water-lines, crude oil lines, gas lines, and brine lines.

The pipe is supplied in sizes from ½ to 2 in., in standard 20-ft lengths, with choice of two wall thicknesses; Extra Heavy Duty (ips Schedule 80), and Standard (ips Schedule 40). Fittings, flanges, and nipples are also available with standard ips threads. The pipe is not recommended for temperatures above 170 deg F, nor for temperatures below minus 20 deg F where physical shock is present. The pipe is easily threaded with standard pipe threading tools or threading machines. The pipe can be bent in regular pipe forming equipment if it is first heated to soften it.

More information? Circle Item 14 on postcard, page 130

Redesigned Bimetal Thermostats

Redesigned bimetal thermostats incorporating pin type construction are announced by Stevens Mfg. Co., Mansfield, Ohio. The manufacturer states that this design improvement on the Stemco Type S and snap-acting Type SA thermostats gives linear operation over thousands of cycles because it maintains calibration longer.

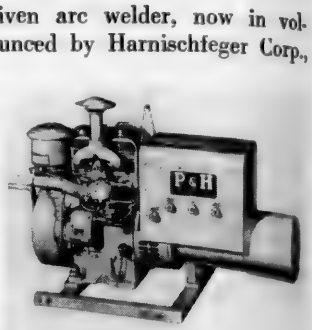


In the new units, a centerless ground Steatite pin inserted in the lower end of the adjusting stem carries a hardened steel pin which applies adjustment pressure against the contact spring member. The thermostats also feature a strip bimetal thermal member which is electrically independent since the current flows through the alloy contact springs instead of the bimetal. This eliminates false cycling or jitters. Single stud mounting, a wide variety of terminal arrangements, and adjusting stem to customer specifications are also featured.

More information? Circle Item 15 on postcard, page 130

Arc Welder is Portable

A gasoline engine driven arc welder, now in volume production, is announced by Harnischfeger Corp., Milwaukee, Wis. Of entirely new design, the Model WN-150 combines small, compact size with high output.



Power is supplied by a two-cylinder, air-cooled gasoline engine close coupled to the welding generator. Control has been simplified by the use of plug-in stations and by a variable-speed engine which covers the full heat range. Capacity is 20 to 200 amp. Weight of the new unit is 425 lb and dimensions are: 45 inches overall, 20 inches in height. It is available with two-wheel mounting. The company states that in designing the new unit, the weight was kept low and dimensions small so that it could be jeep mounted or carried in small trucks, that it is intended to give an all-purpose welding service in the shop and in the field at a minimum of welder investment.

More information? Circle Item 16 on postcard, page 130

Gate Valve Has Non-rising Stem

A non-rising stem gate valve is offered by Hammond Brass Works, Hammond, Ind.

Known as the No. 616 Utility Pattern Gate Valve, it is available in ½, ¾, 1, 1¼, 1½ and 2-inch sizes. This supplements the company's regular line of gate valves. Construction of the valve is all bronze, with Brite-Kote finish and colored hand wheel. This valve, with full heavy stuffing box, and wedge disc, is for steam, water, oil, air, vacuum or gas service up to 125 lb working steam pressure.

More information? Circle Item 17 on postcard, page 130

Spray Painting Booth

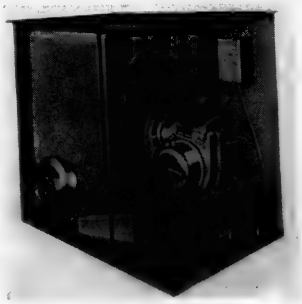
A water wash spray painting booth for use in normal industrial production is a development of Binks Mfg. Co., Chicago, Ill. The product will be known as the Style D booth.

The booth is available in standard sizes ranging from 4 to 20 feet in width and from 7 to 12 feet in height. Additional working depth may be added and provisions can be made for conveyor systems. The booth utilizes smaller pump and fan motors than the company's previous models. The collecting pan and wash chamber are readily accessible for cleaning. The booth is equipped with the company's clog-proof type manifold. There are no nozzles to clean or replace.

More information? Circle Item 18 on postcard, page 130

Self-Contained Floor Furnace

An entirely new packaged oil floor furnace is now in production by Delta Heating Corp., Trenton, N. J. Designated Model FL81, this new unit supplements the first gun-fired oil floor furnace developed by the company two years ago.



The oil burner and controls are contained inside of this new model, wired, tested, and fully assembled before shipment from the factory. The floor grille measures 24 x 36 inches. The unit is installed and serviced from inside the home. All parts are readily accessible through the hinged access door located under the floor grille. The 6-inch flue outlet extends out through both sides of the furnace. The draft regulator supplied is placed inside of the unused flue opening, thereby eliminating a flue pipe tee. A fuel oil filter is factory assembled onto the fuel pump. A twin turbine squirrel-cage fan is built into the furnace to circulate the heated air. The unit measures 31 inches top to bottom. The heat output is 80,000 Btu per hr.

Furnace casing and inner liner are made of heavy galvanized steel to prevent rust. 4-inch knockouts are provided on all sides of the furnace to attach cold air returns, if needed.

More information? Circle Item 19 on postcard, page 130

Hermetically Sealed Thermostat

Electrical thermostats of the C8 Series, newly developed temperature operated switches, are being marketed by G-V Controls Inc., East Orange, N. J. While designed primarily to meet the requirements of electronic and aircraft application, they are suitable for direct control of heaters and for temperature alarm or cut-off service.

The thermostats are adjustable either at the factory or by the purchaser by means of an adjusting arm which projects through the wall of the sealed space. They can be set to operate at any temperature down to 100 deg F below zero or up to 300 def F above zero, and they may be exposed to any temperature within this range without change of control point. The encasing shell is the temperature responsive element, providing rapid response since it is in direct contact with the medium controlled. The contact structure and a mechanism to multiply the shell expansion are protected inside the hermetically sealed space.

The basic thermostat is ½ inch in diameter and 2¾ inches long. Weight is 0.04 lb. Forms are available with mounting flanges, mounting brackets, and pipe threaded fittings.

More information? Circle Item 20 on postcard, page 130

Control for Electric Heating

The introduction of a thermostat control for electric heating, including radiant panels, wall heaters and other types, is announced by Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.

The new thermostat is actuated by a powerful metal bellows, which responds quickly to temperature changes. Designed for individual room temperature control, the thermostat maintains temperatures between 64 deg F and 80 deg F, with a maximum operating differential of 2 deg F. Adjustments for desired temperature are made easily with a dial on the face of the thermostat. The unit has a switch rating of 20 amps (non-inductive load) at 125 or 250 volts a.c., ¾ hp at 115 volts a.c., 1½ hp at 230 volts a.c. It is approved by Underwriters' Laboratories.

Of modern design, the control is contained in a plastic case that extends 1 7/16 inches out from the wall. No adapter plates are required for installation, nor does the cover have to be removed. The unit mounts directly on a standard 2 x 3-inch switch box with two screws.

More information? Circle Item 21 on postcard, page 130

Centrifugal Pumps

A line of close coupled and ball bearing flexible coupled end suction pump is offered by Chicago Pump Co., Chicago, Ill. The pumps are adaptable to cooling tower, air conditioning, chilled water circulating, hot water circulating, pneumatic water systems, and booster service.

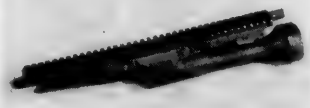
The manufacturer states that these pumps are efficient over a range of capacities of 10 to 400 gpm at heads up to 190 ft. The pumps are equipped with a ceramic face seal which is highly resistant to wear.

Descriptive bulletins 107 and 108 are available.

More information? Circle Item 22 on postcard, page 130

Newly-Designed Gas Burner

A cast-iron burner for natural, manufactured, mixed and L. P. gases has been designed by Perfection Stove Co., Cleveland, Ohio. This is for use with the company's 45,000 and 65,000 Btu per hr space heaters.



The cast-iron burner is the saw slot type instead of the usual drilled port burner and is fashioned from quality cast-iron. The manufacturer states that the cast-iron burner provides a stable flame, good primary air injection, good secondary air distribution, easy installation, rapid lighting and quiet lighting and extinction on any gas. This burner has been the subject of extensive research and has been subjected to exhaustive performance tests.

More information? Circle Item 23 on postcard, page 130

Timer Has One-Knob Control

A new process timer, featuring one-knob control, has been announced by Instrument Dept., General Electric Co., Schenectady, N. Y. Designated the TSA-21, the new product will control the timed simultaneous closing of one electric circuit and opening of another.

Industrial applications for the new process timer include moulding presses, machining tools, and automatic mixing operations; in addition power distribution equipment frequently requires precision control for starting automatic sub-station equipment, and for the reclosing of automatic circuit breakers. Providing for easily adjustable and accurately timed operations from an initial impulse, the new timer includes one set of time-opening main contacts and one set of electrically separate time-closing main contacts. The trip point of the main contacts can be adjusted by an external knob. Also, each timer has a set of instantaneous contacts which can be used independently or as hold contacts for the timer solenoid.

The time scale is calibrated from 0 to 100%. The device weighs 6¾ pounds, and measures 5¾ inches by 5¾ inches by 8 5/32 inches.

More information? Circle Item 24 on postcard, page 130

Plastic Pipe Is Flexible

A lightweight flexible plastic pipe has been developed by Quaker Rubber Corp., Division of H. K. Porter Co., Inc., Philadelphia, Pa.

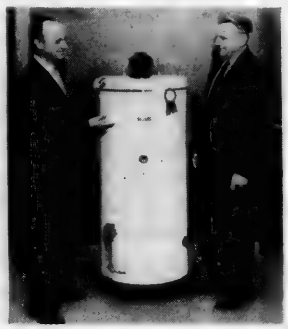
The plastic pipe, Series 200, is made of 100% virgin polyethylene resin, and guaranteed to be non-toxic. The manufacturer claims that it will not rot, rust, or corrode, is easily handled, and requires no special tools to install.

Typical applications include cold water systems, farm piping, sewerage and waste, water service lines, and for conveying industrial chemicals and gases.

More information? Circle Item 25 on postcard, page 130

Gas Heater Is Glass-Lined

The broadening of its line of gas water heaters to include a glass-lined heater in three sizes, is announced by Crane Co., Chicago, Ill. The new water heater, being produced in 20, 30 and 40 gallon sizes, carries a 10-year guarantee, five years unconditional and five years prorated.



Features of the new unit include a Unitrol control which incorporates a 100 per cent shut-off; a magnesium anode rod, and heavy Fiberglass insulation. The 20 gallon KG (Keystone glass) model is rated at 21,000 Btu per hr, and the 30 and 40 gallon sizes have ratings of 28,000 Btu per hr. However, both the KG 30 and 40 have a rating of 32,500 Btu per hr when equipped with a gas pressure regulator.

More information? Circle Item 26 on postcard, page 130

Turbine Pumps Are Submersible

Submersible turbine pump units with capacities ranging from 600 to more than 7000 gallons per hour of water (10 to 121 gals per min) are being produced by The Deming Co., Salem, Ohio.

The entire pumping unit is made of corrosion-resistant materials for operating completely submerged in well water. The pump never needs priming and is quiet in operation with a minimum power requirement. All moving parts of the pump are water cooled and water lubricated. No running seals are required as the motor is designed to operate in water. Windings are enclosed permanently in a stainless steel case and the waterproof cable is protected with a water tight fitting.

The motor and turbine type pumping unit are completely assembled at the factory, ready for placing in the well. Enclosed bronze impellers are securely keyed to the stainless steel pump shaft which is protected through the bearings with stainless steel sleeves. Impellers are the low thrust type, accurately positioned in each bowl or diffuser, and require no adjustment. The stainless steel motor coupling is splined for accurate alignment.

More information? Circle Item 27 on postcard, page 130

Pipe Bender is Redesigned

A portable pipe bender, Model S-2, has been developed by Senna Mfg. Co., Spokane, Wash. Besides bending ½, ¾, and 1-inch iron pipe, as the company's original pipe bender, model S-1 does, this new machine also bends 1¼-inch standard black pipe. It is a heavier machine than the original model and is now using cast-iron rings.

The machine is designed specifically for use in radiant heating jobs and bends iron pipe without heating from 12, 15, 18-inch centers and up at 180 deg or any other degress bend desired. It will make 15 different bends. It will also bend copper tube and steel tube. The pipe is inserted in the machine, the switch thrown on, and the machine makes the bend. After completion of the bend the machine is reversed to relieve pressure so the pipe can be removed. Actual bending time is about 25 seconds.

Shipping weight is approximately 380 lb. It occupies 36 x 46 inches of floor space, and operates on a 1 hp motor.

More information? Circle Item 28 on postcard, page 130

Expansion Joint

An expansion joint has been developed by Rotherm Engineering Co., Chicago, Ill., and will be manufactured in all pipe thread sizes from ½ to 6 inches inclusive.

This expansion joint has two ball seats that have a Teflon spring seated wedge seal. It is stated that the Teflon wedge seal will seat without leakage by means of this spring and the pressure involved and it will not adhere to the metal. The two ball seats and the inside of the expansion joint tube will be chrome plated for easy sliding action.

These joints are capable of handling up to 150 lb steam pressures at a temperature from minus 65 deg to plus 500 deg. The ball seats permit a flexible action, which gives this new expansion joint complete freedom of movement taking care of deflection in the piping, any twisting action of the piping, as well as any expansion. The total eccentricity designed into this joint is 10 deg on each end. These joints can be made in steel, stainless steel or bronze.

More information? Circle Item 29 on postcard, page 130

Temperature Control Device

A small, compact Model 292 Series Wheelco Capacitrol, designed for indicating and control in the process industries, is announced by Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill.

Both the temperature measuring system and the control chassis of this instrument are of plug-in design. This feature, claims the manufacturer, permits quick removal of either the measuring system or control chassis for easy replacement and servicing without disturbing the instrument or external wiring. The instrument provides for flexible on the job adjustments. The balancing adjustment for tuning the alignment index and indicating pointer to exact coincidence, plus adjustment of anticipatory action cycle time (on Model 292C), along with control setting are all front accessible.

Thermocouple break protection, that shuts off the fuel supply in case of thermocouple or lead wire failure, can be supplied as an extra feature. The vacuum tube used in the control chassis may be purchased from any electronic supply house.

More information? Circle Item 30 on postcard, page 130

Add to Air Conditioning Line

Five additions to its line of air conditioning equipment, including a floor type room air conditioner, a window mounted room air conditioner, two cooling towers, and an evaporative condenser, are announced by Kauffman Air Conditioning Co., St. Louis, Mo.

The floor type room air conditioner comes in four models designated W, A, B, and C, used singly or multiple to accommodate varied room requirements. The cooling capacity of the four models ranges from 9,500 Btu per hr to 23,500 Btu per hr. The units are housed in decorative steel cabinets.

The window unit comes in four models designated Y, X, J, and K. These units contain a compressor, air circulating fan and motor, air filter, cooling coil, air-cooled condenser, and all necessary internal piping, wiring, and controls. The unit is sound-proofed with insulating material.

The first of the two cooling towers is designed specifically for residential application. Designated type A C, it is made for 2-3-5-7½-10 ton cooling systems. This tower is recommended where there is no water, bad water conditions, restrictions on water use, or there is high water cost.

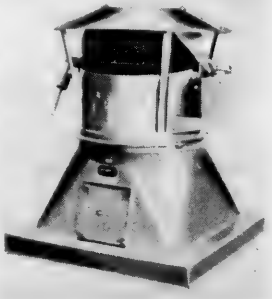
The second cooling tower is adaptable to both residential and commercial installations. It is furnished in sizes 7 to 16 tons capacity. This cooling tower is based on cooling three gallons of water per min per ton through a 10 deg range.

The evaporative condenser cools by using a combination of water and air to condense gases used in residential or commercial air conditioning systems. The unit contains a fan, vaporizor, casings, condenser, eliminator, and water reservoir.

More information? Circle Item 31 on postcard, page 130

Roof Ventilator is Automatic

A new and completely automatic roof ventilator is being marketed by The Harvey P. Bertram Co., Cincinnati, Ohio. The new ventilator is reported by the manufacturer to operate during power failure as well as under normal conditions. Called the Pyrovent, the new ventilator keeps plant air clean, and becomes an automatic escape valve for smoke, heat and gases in case of fire or explosion.



The ventilator includes a fan, exhaust stack with damper flaps and an ultra-sensitive electric thermostat for the detection of fire. In case of fire, the fan is automatically started when the rate of temperature rise exceeds 15 deg per minute, or when thermostat limits are reached. Should power failure occur, damper flaps automatically open to provide an exit for smoke, heat or gases present in the building. The ventilator is controlled by simple start and stop pushbuttons which operate the fan and damper flaps. Both the fan and dampers are powered by individual motors.

They will be manufactured in sizes 24 inches to 72 inches fan diameter in direct and belt driven types.

More information? Circle Item 32 on postcard, page 130

Burner Has Unique Diffuser

A new Model JC Gun Burner with capacities from .50 to 2.75 gph, is announced by Toridheet Div., Cleveland Steel Products Corp., Cleveland, Ohio. A stainless steel multi-jet non-adjustable diffuser, capable of withstanding temperatures up to 1800 deg, it is reported to produce quiet combustion and high CO_2.

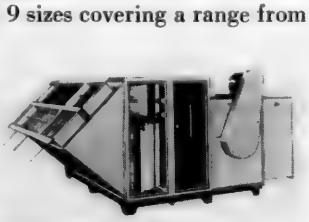
Quick action adjustable base is easily removed to convert burner to flange mounting using cast flange available at option. Simplified air adjustment and improved blower wheel, with integral hub functioning as part of the flexible coupling to the fuel unit, are also new design features. Electrode and oil line assembly are removable through access opening in rear of the housing for easy servicing. Manifold lengths of 6, 8, and 16 inches are standard.

More information? Circle Item 33 on postcard, page 130

Additions to Air Handling Line

The addition of a series of Multizone units to its line of central station air handling units is announced by Bush Mfg. Co., West Hartford, Conn.

The units are available in 9 sizes covering a range from 1800 to 21,600 cfm. Zone dividers can be changed in the field and discharge can be arranged vertically, horizontally, or in a combination of both. The entire interior is insulated and undercoated. The units are sectional in construction and can be shipped sectionally when this is desired to facilitate installation.

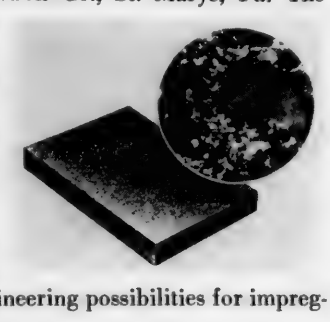


The units are for use where conditioning of separate rooms or zones of a single large room at different temperatures is desirable using only one unit rather than several units.

More information? Circle Item 34 on postcard, page 130

New Porous Carbon Is 75% Air

A highly porous, fine grain carbon has been developed by Stackpole Carbon Co., St. Marys, Pa. The carbon is 75% air yet retains the usual carbon characteristics such as high electrical conductivity, resistance to chemical attack, and stability under high temperatures.



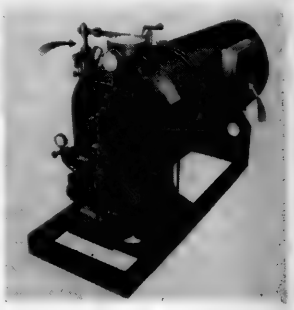
Supplied in blocks or in sheets, the new carbon offers interesting engineering possibilities for impregnation or for use as filter plates in certain applications. Its extremely fine grain results in a large carbon surface area despite the high porosity of the material.

The porous carbon is available either in blocks or in sheets up to approximately 10 inches x 10 inches and thickness up to 1½ inches.

More information? Circle Item 35 on postcard, page 130

Steam Generator Is Redesigned

Relocation of the electronic controls that regulate the automatic operation of the company's Cyclotherm 40 hp package steam generator (Model C1400) is announced by Cyclotherm Div., United States Radiator Corp., Oswego, N. Y.



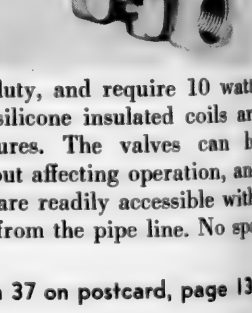
The control box, formerly mounted on the boiler skids, has been moved to a position on the side of the boiler jacket so that you can examine or work on the controls in a standing position. The water column on the C1400 has been moved to the left hand side of the unit as you face the boiler. The controls are mounted on the right.

The redesigned steam generator operates on gas, oil or gas and oil combination. It requires small installation space because it utilizes the company's Cyclonic Combustion principle, with three square feet of heating surface per boiler hp. It can be installed in an area 9 ft 2¼ inches long over-all, 3 ft 5 inches wide, and 4 ft 7 inches high. The boiler requires no stack. However, local and state codes must be conformed to.

More information? Circle Item 36 on postcard, page 130

Two-Way Solenoid Valves

A line of compact, two-way solenoid valves is announced by Automatic Switch Co., Orange, N. J. These are self-contained internal pilot operated valves for use in controlling the flow of air, gas, water, light oil, and other non-corrosive fluids.

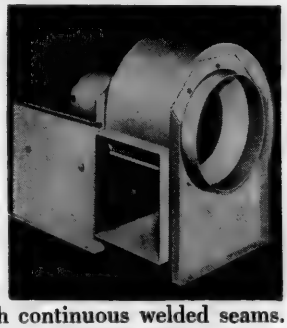


The valves have forged brass body and bonnet construction, with magnetic stainless steel core and a Hycar diaphragm. Packless construction is used, there are no stuffing boxes or sliding glands. The solenoid coils are designed for continuous duty, and require 10 watts for operation. Class H glass silicone insulated coils are available for high temperatures. The valves can be mounted in any position without affecting operation, and all internal parts on the pilot are readily accessible without removing the valve body from the pipe line. No special tools are needed.

More information? Circle Item 37 on postcard, page 130

Direct and V-Belt Driven Fans

A large volume fan, available with direct or V-belt drive, for standard or heavy duty has been placed on the market by Chicago Blower Corp., Franklin Park, Ill. The direct drive fans are supplied in five sizes with volumes from 400 to 3250 cfm and pressures to 1½-inch SP The V-belt driven fans are supplied in 14 sizes with volumes up to 18,000 cfm and pressures to 1½-inch SP.

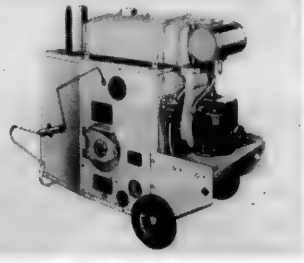


The housings and bases on these MD fans are fabricated of extra-heavy sheet steel with continuous welded seams. Streamlined fan inlets account for the high efficiency and low operating noise levels. The fans can be supplied with six different types of acid resistant coatings that will meet any acid or corrosive fume condition. The V-belt driven fans are furnished with a forward curved wheel in all standard duty types and with a backward curved wheel in all heavy duty types. Wheels are of all-welded construction and both statically and dynamically balanced. Self-aligning, grease-lubricated ball-bearing pillow blocks are furnished as standard. Motors are of nationally-known make. Single phase fractional sizes are resilient mounted. Integral polyphase motors are rigid ball-bearing type.

More information? Circle Item 38 on postcard, page 130

Air Heater Is Portable

A portable air heater that can be converted from electric motor to gasoline engine power in minutes is offered by Herman Nelson Div., American Air Filter Co., Inc., Moline, Ill. A conversion kit allows the electric motor to be replaced with a gasoline engine, and vice versa, whenever the operator wishes to change the type of prime mover.



This heater, called the Herman Nelson Utility Model, is adaptable to industry, and can be used just as effectively in plants or warehouses without electricity as on sites with it. It is optionally oil-fired or gasoline-fired, yet is completely safe with fumes vented outside the work area. It may be operated indoors without danger from fire.

From 75,000 to 425,000 Btu per hr of heated air can be supplied by the heater. Being an entirely self-contained unit, its operation is simple, with no ignition electrodes, transformers or relays. Heat output may be regulated, and the large capacity fuel tank allows overnight operation without refueling. Among the recommended industrial uses are temporary space heating, pre-heating of building materials, and engines, and personnel heating both indoors and out.

More information? Circle Item 39 on postcard, page 130

Pipe Strainers in Eight Sizes

Features designed to minimize maintenance difficulties are incorporated in a line of cast semi-steel Y-type pipe strainers developed by Armstrong Machine Works, Three Rivers, Mich. The strainers are for use in steam, air, water, oil and gas lines at pressures to 250 pounds. There are eight sizes from ¼ through 2 inches.

Straight bushing threads instead of pipe threads ease removal of bushing and screen. A copper - asbestos gasket is positioned between the base of the bushing and the body, eliminating the possibility of gasket blowout. Only a light torque is required to assure a leak-tight seal. Type 430 stainless steel corrosion-resistant screens are standard, either perforated with 225 holes of .045 inch diameter per sq in or 20 x 100 mesh wire cloth. Screens of other materials available on special order.

More information? Circle Item 40 on postcard, page 130

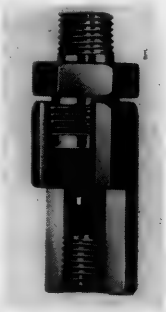
Improved Furnace Controls

The incorporation of a fast-acting element and universal voltage contacts to its line of liquid expansion furnace controls, is announced by Penn Controls, Inc., Goshen, Ind. The type 518 limit control and type 520 combination fan and limit control will be equipped with a new grid-type element for faster response, and gold plated contacts will be added to the limit or limit side of these controls so that they can handle line voltage, low voltage, or millivolt service. In addition, the grid type element will be added to the company's type 519 fan control.

More information? Circle Item 41 on postcard, page 130

Valve Has No Moving Parts

A check valve that provides maximum flow with low opening pressures and bubble-tight operation throughout its entire working range is being produced by Betts Machine Co., Warren, Pa.



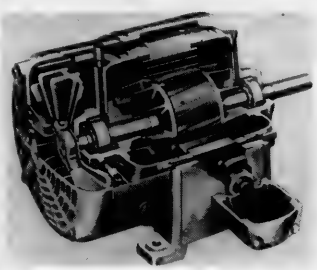
Named the Warren Check Valve, it is of simple functional design. Consisting solely of a sturdy, two-piece metal body and a special composition sleeve, the valve has no seat and no spring or other metal moving parts. The durable sleeve is easily and quickly replaceable if ever damaged. Silent in operation and immune to vibration, the valve may be mounted in any position. It remains tight and provides trouble-free service even when small amounts of foreign matter are present.

The check valve is available in a wide range of sizes and materials.

More information? Circle Item 42 on postcard, page 130

Motor for Chemical Services

The development of a motor particularly designed for chemical services is announced by U. S. Electrical Motors Inc., Los Angeles, Calif. The motor is totally-enclosed and corrosion protected, designed for dangerous and damaging atmospheres.

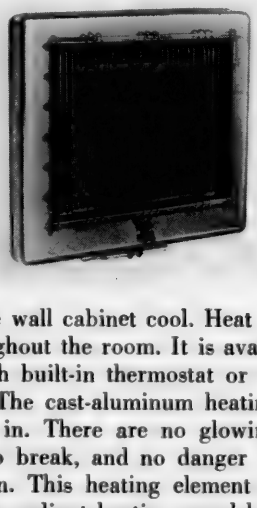


Features of the motor are a stainless steel stator band surrounding the inner enclosed case, a stainless steel fan cover guard, a cast-iron conduit box sealed with a non-deteriorating, impervious compound, a cast-iron ventilating fan for the totally-enclosed design or a cast bronze fan for explosion proof service, cadmium plated screws and fittings exposed to the atmosphere, elongated bearing caps, and a double sealed moisture drain. Other features are the company's asbestos-protected windings, Lubriflush transverse lubrication, and normalized bearings. Known as types SD and SE the motor is produced in ratings from 3 to 150 horsepower.

More information? Circle Item 43 on postcard page 130

Electric Heating Panel

A wall-type electric heating panel which combines the principles of both radiant and convection heating has been developed by Electromode Corp., Rochester, N. Y. It is rated at 1100 watts, 3753 Btu per hr, and is available for 120 or 240 volts. Overall dimensions are 21 inches wide, 17 inches high and 2¾ inches deep.



Its radiation fins of cast-aluminum provide free flow of heated air, and special deflector channels force the heat outward, permit secondory air flow, and keep the wall cabinet cool. Heat is radiated and circulated throughout the room. It is available in automatic models with built-in thermostat or in manually controlled models. The cast-aluminum heating element is completely sealed in. There are no glowing coils, no glass or ceramics to break, and no danger of fire, shock, burn or explosion. This heating element is guaranteed for five years. The radiant heating panel has a smooth, silver grey hamertone finish and nickel plated grille.

More information? Circle Item 44 on postcard page 130

Saddle Tees for Plastic Pipe

Green Line Tap-In saddle tees for flexible plastic pipe are being distributed by Hall-Meyer Co., Culver City, Calif.

These saddle fittings are used as tees for laterals, as a cross on a main line, or as tees for risers in sprinkler installations. Made of cast brass, the saddles are guaranteed leak-proof at all pressures. They are designed for sprinkler irrigation systems both in homes and on the farm, and for water distribution systems wherever plastic pipe is used. They are available in ½ x ½-inch, ¾ x ½-inch, 1 x ¾-inch, 1½ x ½-inch, 1½ x ¾-inch, 2 x ½-inch, and 2 x ¾-inch sizes.

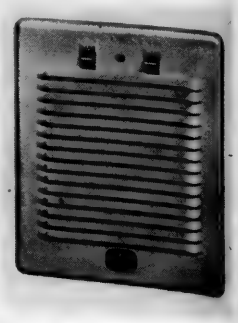
Installation requires no cutting of the plastic pipe and eliminates the hazard of pipe coming apart at laterals due to temperature contraction or pressure surge.

Saddles for 3, 4, and 6-inch pipe are available on special order.

More information? Circle Item 45 on postcard, page 130

New Fan Heater Offered

A low wattage wall heat fan for small rooms such as dressing rooms, nurseries, dinettes or dens is offered by Thermador Electrical Mfg. Co., Los Angeles, Calif. Features are separate switches for fan and heat located near the top of the heater and a neon indicator light which glows when the heater is operating.



The unit has a louver grille which forces the flow of warmed air downward, thus warming the room from the floor up. Resistance coils are nichrome wire and fan action induces constant air flow over coils preventing oxidation and deterioration through red glow and maintaining even black heat. The heavy-duty motor is a single-phase induction type and the 4-blade fan is dynamically balanced. The units are available with or without a built in 25 amp thermostat.

Finishes offer a choice of bronze, white enamel, or stainless steel.

More information? Circle Item 46 on postcard, page 130

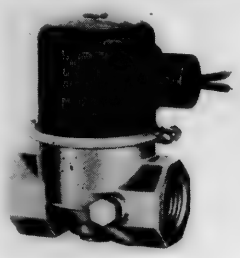
Blower Wheel Is Offered

A durable, trouble-free blower wheel is announced by Mayne Products Co., Dayton, Ohio, for the heating and air conditioning industry. Built with only eight parts, the wheel features simplified construction. The manufacturer states that the simplified method of fabrication, with two blade louvers, two center discs, two hubs and two set screws, assures a longer life. Instead of a flat end ring, with rivet holes and holding 48 or more separate blades, the new wheel requires only two stamped strips of blades. One blade section is superimposed upon the other and then these two blade sections are interlocked together and welded into one unit.

More information? Circle Item 47 on postcard, page 130

Gas Valve Is Noiseless

Free of both valve closing impact noise and disturbing hum is a newly developed magnetic gas valve manufactured by General Controls Co., Glendale, Calif. The valve, for gravity and forced air furnaces and unit heaters, opens and closes gas lines at the demand of room thermostats, limit controls and other devices.

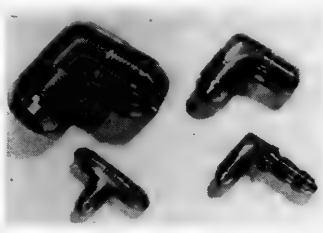


The magnetic gas valve, called the K-3A, is a soft seated type and has a solenoid to make it humless. The valve disc is made of synthetic rubber so that it may settle quietly against the valve seat when closed. It is brought into the shutoff position by spring action plus the steady pressure of gas. These two factors assure tight shutoff. Current consumption is low, and upon interruption of the current the valve immediately closes. The valve is available in sizes from ⅜-inch to ¾-inch ips. While adaptable to many applications, it is primarily a key component in the company's T-30 solenoid control system for 24-volt heating control.

More information? Circle Item 48 on postcard, page 130

Stainless Steel Fittings

Stainless steel fittings produced by centrifugal casting are announced by Industrial Research Laboratories Div., Honolulu Oil Corp., Los Angeles, Calif. The manufacturer states that production costs of fittings to standard AN specifications or to special requirements can be substantially cut, and deliveries are made on a 30-day or less basis.



Tubing, bar stock and forging dies are not needed for the new fittings, and no hogging out is needed. The manufacturer states that for these reasons, short runs as well as special orders can be produced at low cost. Quality control is maintained through radiographic check, pressure testing and chemical analysis. The fittings are available in many sizes and shapes, as well as in quantities for bulk orders.

More information? Circle Item 49 on postcard, page 130

Plastic Filter Material

The production of CPS (controlled pore size) woven Teflon filter cloth is announced by Porous Plastic Filter Co., Glen Cove, N. Y.

The cloth is woven of Teflon fiber which has a tensile strength twenty times that of solid Teflon while retaining corrosion and temperature resistance of Teflon. The new filter material has a low coefficient of friction, high water repellency, and little affinity for adhesives. Thus cake removal results regardless of the material filtered. The fiber is available in two grades, the finer for the removal of particles 25 microns and over, and the coarser for the removal of particles 40 microns and over. It has a lower service temperature limit of minus 100 deg F and an upper temperature limit of 400 deg F to 525 deg F depending upon service conditions.

The cloth is available in widths up to 44 inches and the cloth will also be cut and tailored to order to fit existing filters.

More information? Circle Item 50 on postcard, page 130

Humidity Controller Is Offered

A humidity controller called the Bendix-Friez Automatic Humidistat Control is being marketed by The Abbeon Supply Co., Jamaica, N. Y. The device is an automatic control to operate electrically powered humidifiers and dehumidifiers up to 1/6 hp.

The control operates in much the same manner as a room type thermostat. The control is hung on the wall and plugged directly into a wall outlet. The humidifier or dehumidifier is plugged in and the installation is completed. The manufacturer states that the device has no complicated calibrations and is relatively trouble-free, making it applicable to both home or factory installations.

The device is furnished with either a standard dial or a dial graduated in percentage of relative humidity.

More information? Circle Item 51 on postcard, page 130

Commercial Water Heaters

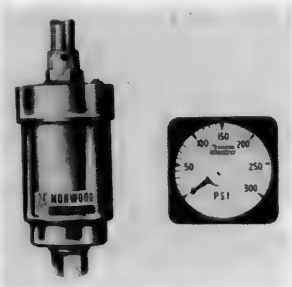
The Model 718 Burkay commercial water heater is introduced by Permaglas Div., A. O. Smith Corp., Milwaukee, Wis. Over-all dimensions of the heater are 27 inch diameter and 78 inch height, including the 10 inch diameter skirt type draft hood. This high capacity unit has an input rating of 420,000 Btu per hr and will produce 403 gal per hr at 100 deg temperature rise.

The unit is expected to find a market primarily in the laundry store, swimming pool, apartment and larger restaurant fields. It also will particularly lend itself to use with the company's patented two temperature booster recovery system. It is approved by the AGA for use with natural, mixed and manufactured gases. It is of the reverse flow type with non-ferrous waterways and employs a copper-finned heat exchanger with a coiled tubing combustion chamber. Controls include a gas valve, safety pilot and high limit control. The entire heater is finished in grey hammerloid.

More information? Circle Item 52 on postcard, page 130

Temperature Measuring System

An ElectroSyn pressure and temperature measuring system has been developed for industrial use by Controls Div., Control Engineering Corp., Norwood, Mass. The system is based on a signal generator which has been tested in military servo-systems.



The signal generator is a high resolution, electro-magnetic, rotary transducer with a linear output. Fluid pressure in a twisted Bourdon tube or a temperature sensitive bi-metallic ribbon spiral rotates the signal generator a minute amount producing a proportionate electric signal. The complete system consists of a source of constant 60 cycle current, pressure or temperature detectors which can be directly mounted on a vessel or pipe line without additional support, and an indicating long scale meter mounted on a control panel remotely located from the detection points. Use of the system facilitates remote readings of temperatures and pressures without complex electronic circuits.

More information? Circle Item 53 on postcard, page 130

All-Purpose Filter Unit

After several years of testing in the field, the introduction of its Placo self-finishing and self-relieving filter unit is announced by Metal Finishing Mfg. Corp., Brooklyn, N. Y.

Constructed of type 316 stainless steel, these units are designed for filtering all acid and alkaline solutions. Neoprene impeller, large graphite bearings and ball bearing ring enclosed motors are features of the unit. The unit filters in depth, through cartridges of cotton, dynel and carbon, making possible microscopic clarification, including removal of colloidal solids. The filter units are available with capacities ranging from 60 to 1600 gallons per minute. No priming is necessary to operate the filter, a switch starts the filtration at full pressure.

More information? Circle Item 54 on postcard, page 130

Line of Colored Acetate Film Tapes

Production of a line of pressure sensitive colored acetate film tapes, suitable for use plain or with printed messages or designs, is announced by Labelon Tape Co., Inc., Rochester, N. Y. This new product is an addition to the company's paper Flatback, paper Oil-Stik, and plastic Write-on-it tapes.

The colored acetate film tape uses a .003-inch acetate film base and it is integrally colored while being cast into sheet material. The manufacturer states that for this reason the colors are light-fast, non-bleeding and exceptionally bright. It is further claimed that the product will not dry out, expand, contract, or react to moisture, ages well and unwinds easier. The tape is available either plain or printed in a large variety of colors, including white, yellow, blue, green, red and black.

Among the uses of the tape are included identifying and labeling pipes wiring, cans and office supplies; sealing tubes, bags and boxes; holding lightweight articles on packages, and holding special sales items in combination. It can also be used for repairing small objects and edging pictures or signs, as well as for many other applications.

More information? Circle Item 55 on postcard, page 130

Blowers Made of Plastic

A line of Boltaron 6200 PVC blowers for expelling corrosive air, fumes and gases is introduced by Industrial Plastic Fabricators, Inc., Norwood, Mass.

The impeller blade is also fabricated of plastic with threaded spinner cap aero-dynamically balanced for smooth, vibration-free, high speed operation. The back-curved design of the blade prevents overload and creates less turbulence. All shaft areas and bearings are protected and sealed against corrosive attack. The light-weight, smooth-surfaced, non-porous, plastic (non-plasticized polyvinyl chloride) does not pick up residual matter from the air or gases.

The line of blowers include capacities of 500, 1,500, and 4,300 Cfm.

More information? Circle Item 56 on postcard, page 130

Packing Holds All Freons

A compressed asbestos sheet packing for head gaskets on refrigeration compressors is placed on the market by Packing Division, Raybestos - Manhattan, Inc., Manheim, Pa.

Known as R/M No. R-54, the sheet is solely for air-conditioning and refrigeration use. An all-purpose sheet, it is effective in sealing against all Freons including Freon-22. The binder in the sheet packing is a new type of Neoprene which has been specially extended. 70% to 75% of the sheet is asbestos. The asbestos is uniformly opened and coated prior to the critically controlled sheeting procedure. According to the manufacturer, special ingredients and a change in sheeting techniques account for the ability of the sheet packing to seal against all Freons.

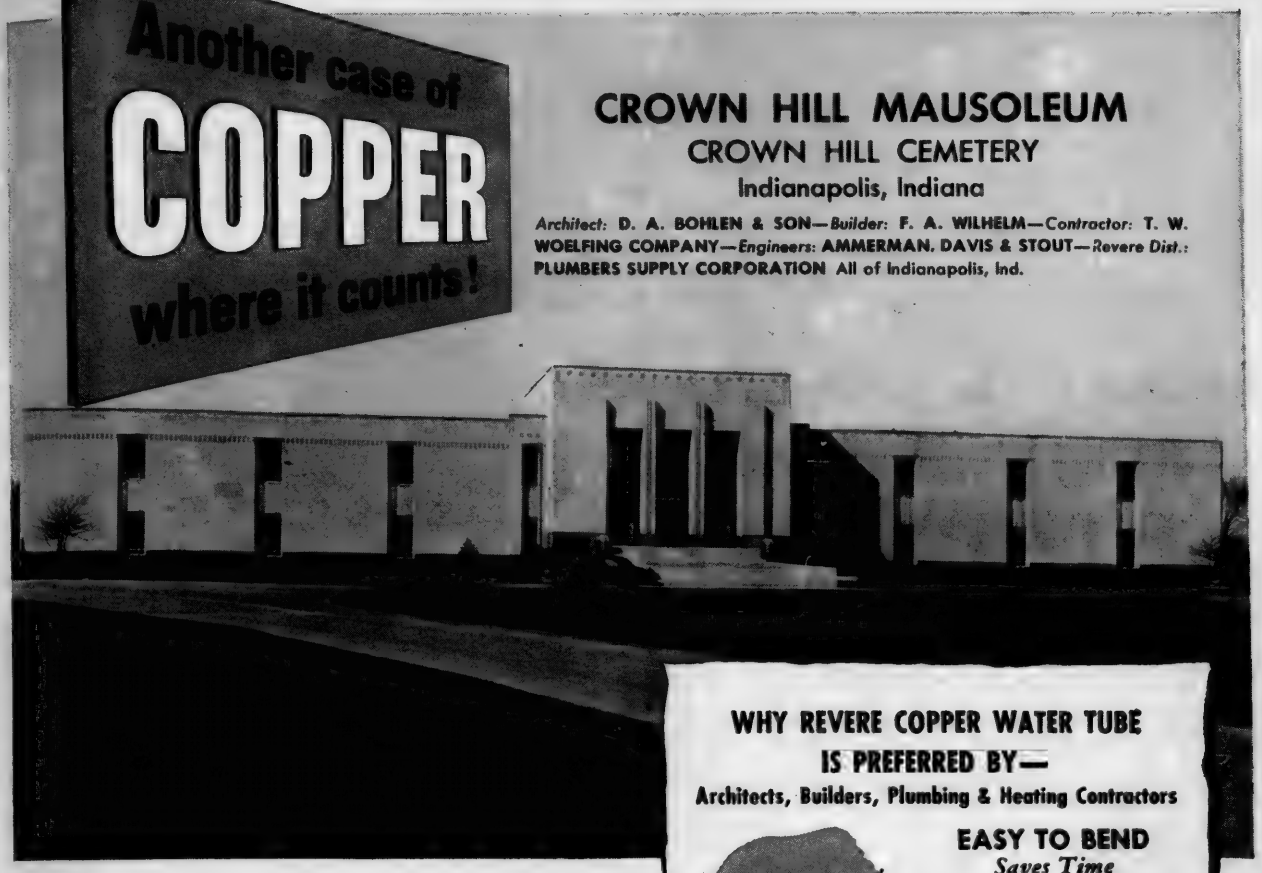
The packing has an average tensile strength of 3000 psi and a density of 1.10 oz. per cu in. It will bend 180 deg without cracking over a rod with diameter four times the thickness of the sheet. It is furnished in standard thicknesses of 1/64 in. through ⅛ in. and in eleven sheet sizes ranging from 40 x 40 inches to 150 x 150 inches.

More information? Circle Item 57 on postcard, page 130

Another case of
COPPER
where it counts!

CROWN HILL MAUSOLEUM
CROWN HILL CEMETERY
Indianapolis, Indiana

Architect: D. A. BOHLEN & SON—*Builder:* F. A. WILHELM—*Contractor:* T. W. WOELFING COMPANY—*Engineers:* AMMERMAN, DAVIS & STOUT—*Revere Dist.:* PLUMBERS SUPPLY CORPORATION All of Indianapolis, Ind.



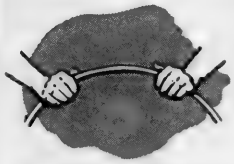
Here is a most unusual application of Revere Copper Water Tube . . . as vent lines for the individual crypts in the Crown Hill Mausoleum. Copper Tube was selected because of its enduring, non-rusting qualities and because of the large number of joints necessary in this installation. With copper tube, solder joints were made in a jiffy. Laborious, time-consuming caulking, thread-cutting, wrench work and tedious fitting were eliminated.

Approximately 13,100 lbs. (7,500 ft.) of two-inch Type "L" Revere Copper Water Tube in Soft Temper and in 20-foot lengths was specified. There was also over 1,000 lbs. of Revere Sheet Copper used for flashing this building.

A glance at the panel on the right will tell you briefly why Revere Copper Water Tube is preferred, whether it be for vent lines, waste stack lines, radiant panel heating, air conditioning, hot and cold water lines, underground service lines or processing lines. There is plenty of copper these days so you don't have to skimp or substitute. Using copper is a good way to keep out of trouble. Trouble can be far more costly than copper. Should you need help on technical problems let us know and we'll put you in touch with Revere's Technical Advisory Service. No obligation.

WHY REVERE COPPER WATER TUBE IS PREFERRED BY—

Architects, Builders, Plumbing & Heating Contractors

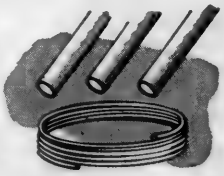


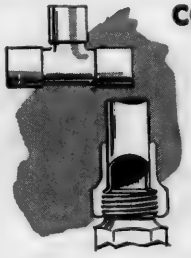
EASY TO BEND
Saves Time

Revere Copper Water Tube is easy to bend. Soft temper can be bent by hand to meet installation conditions.

HANDY LENGTHS
Save Fittings . . . Labor

Revere Copper Water Tube comes in straight lengths of 20' in hard and soft tempers. 60' coils of soft temper reduce the number of fittings needed.





SOLDER OR COMPRESSION FITTINGS
Need Less Work Room . . . Save Metal

No worry about wrench room when you use Revere Copper Water Tube with solder fittings. Compression fittings can also be used. No threading is necessary with either type fitting. Wall thickness of tube used can thus be less than for threaded pipe.

NON-RUSTING

Rustable pipe eventually clogs as shown in drawing at top right. Non-rustable Revere Copper Water Tube suffers no loss of flow or pressure as shown at bottom right. No allowance in pipe size need be made for rust accumulation with Revere Copper Water Tube.

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COPPER AND BRASS INCORPORATED

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• • •

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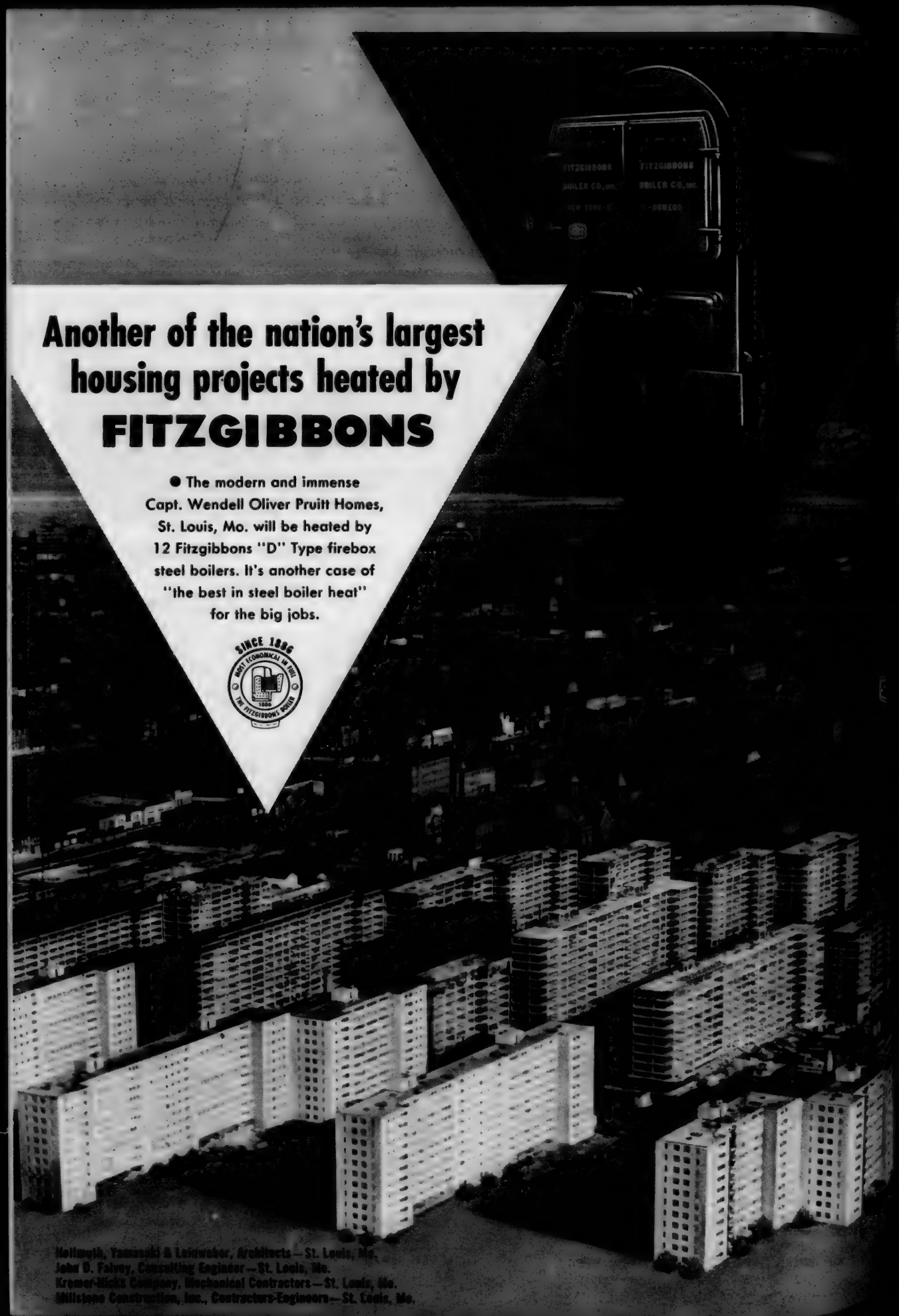
Another of the nation's largest housing projects heated by
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● The modern and immense Capt. Wendell Oliver Pruitt Homes, St. Louis, Mo. will be heated by 12 Fitzgibbons "D" Type firebox steel boilers. It's another case of "the best in steel boiler heat" for the big jobs.
SINCE 1856
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John D. Falvey, Consulting Engineer—St. Louis, Mo.
Kramer-Hicks Company, Mechanical Contractors—St. Louis, Mo.
Millstone Construction, Inc., Contractors-Engineers—St. Louis, Mo.

PRODUCT INFORMATION SERVICE

Use the postage-free postcard below for further information on:

- **News of Equipment and Materials**

or a copy of the following

- **New Catalogs**

Circle the item Numbers in which you are interested and print clearly your name and address with title.

NEW CATALOGS

DATA CARD ON STRESS RUPTURE VALUES—Engineers associated with the design of equipment operating under stress at high temperatures over long periods of time will be interested in a new data card, TDC 159-A published by Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa. The card presents stress rupture data on eleven tubing steels used in high temperature service. Data developed by stress rupture tests offer means of evaluating the characteristics of metal for operation under stress and high temperatures over long periods.....Item 101

FLEXIBLE HOSE AND DUCT MOVE VARIED MATERIALS—Industrial installations of Flexaust hose and of Portovent duct for moving air and other materials are described in Bulletin No. 40 published by The Flexaust Co., New York, N. Y. The bulletin illustrates such applications as spot cooling or heating, air-cleaner connections, abrasive dust collection, chemical fume exhausting, dehumidification, and air-conditioning.....Item 102

[illegible] BOILERS—A booklet giving complete information of the Kewanee Reserve Rating Plan has just been published by Kewanee-Ross Corp., Kewanee, Ill. It is titled, A Report To Those Concerned with the Specification, Selection, Sale of Steel Firetube Boilers. The booklet has been published as part of a full scale campaign this company has been waging on rating methods.....Item 103

[illegible] SPEED AND DIRECTION RECORDER—A new leaflet form, 170, published by Beckman & Whitley, Inc., San Carlos, Calif., describes that company's Model [illegible] instrumentation for meteorological research — particularly microclimatology. Linearity data are given in curve form, and the data sheet contains specifications on a wind-speed recorder, a wind-direction recorder, and accessories. It also includes specifications of recording meters.....Item 104

MOTORS FOR FAN AND BLOWER APPLICATIONS—A new ten-page publication describing its line of shaded-pole fractional horsepower motors for fan and blower applications is issued by General Electric Co., Schenectady, N. Y. The two-color bulletin GEA-6134, illustrates features and applications of the motors, and gives complete specifications, including dimensions.....Item 105

3-IN-1 CONTROL AIDS TEACHERS—A new 4-page folder published by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., describes that company's new Schoolmaster system of individual room temperature control designed specifically for use in schools. The folder describes the characteristics of the system, showing photographs of the thermostat and functions of the system. The back page shows an installation.....Item 106

DEHUMIDIFICATION OF AIR—A bulletin giving information on dehumidification theory and application, and describing its Desomatic line of dehumidification equipment is issued by Daly, Merritt & Sullivan, Inc., Falls Church, Va. The bulletin defines dehumidification and describes methods of dehumidification including flow diagrams and charts. It describes the company's line of equipment and its applications. Photographs of the equipment are included. Attached is a moisture load calculation data sheet and questionnaire form.....Item 107

UNIT HEATERS—Bulletin 7517, covering the latest design of its unit heaters for steam or hot water applications, is issued by American Blower Corp., Detroit, Mich. The 44-page bulletin covers features of design, general engineering data, capacity tables and piping diagrams, and other material of interest to heating engineers.....Item 108

PLASTIC VALVES—Plastic valves of unplasticized polyvinyl chloride are described in new literature issued by Industrial Plastic Fabricators Inc., Norwood, Mass., featuring both needle and globe valves. Supplementary data on this bulletin covers nuts and bolts of Boltaron 6200 P.V.C., pails, dipper, and pitchers, and pipe compound.....Item 109

NEW BROCHURE ON PACKAGED BOILERS—A new 8-page brochure on its line of packaged boilers is announced by Wm. Bros. Boiler & Mfg. Co., Minneapolis, Minn. It includes information on operation and specifications on Type 1, Type 2 and Type 3 packaged boilers, built to meet steam requirements in the medium pressure range from 4150 to 50,000 lbs. of steam per hour. Engineering data and photos are included.....Item 110

COMBINATION OIL-GAS BURNERS—A 4-page bulletin describing its Model BR series of combination oil-gas burners is issued by Preferred Utilities Mfg. Corp., New York, N. Y. The bulletin gives a complete description of the burner including a photograph of the unit, sectional drawing, piping layout, specifications table, list of electrical characteristics and lists of equipment.....Item 111

AUTOMATIC PROCESS CONTROL—The Tools of Automation, a new twelve-page booklet issued by Reliance Electric and Engineering Co., Cleveland, Ohio, expresses the company's philosophy of combining applied engineering, creative thinking, and electric motor drives to provide the know-how for automation of single machines or continuous processes. Many illustrations and sketches accompany each section to help tell the automation story. Individual booklet divisions illustrate the combination of motors and creative engineering as an aid to choosing the right motor for the job; adjustable-speed drives as a tool of Automation; and electronic controls and regulators that provide precise, accurate motor drive control and regulation. A final section of the booklet includes captioned photographs which graphically illustrate automation at work in many industries.....Item 112

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HEAVY OIL BURNERS—An 8-page bulletin No. 175-H, issued by Preferred Utilities Mfg. Corp., New York, N. Y., describes its line of heavy oil burners and their characteristics. Photographs and break-down description of components are included. Included are lists of electrical characteristics, standard equipment for automatic and semi-automatic burners, and a table of nominal burner specifications.....Item 113

INSTRUMENTATION FOR pH MEASUREMENT—A new 32-page bulletin on complete instrumentation for pH measurement and automatic control has just been published by The Bristol Co., Waterbury, Conn. It contains drawings and photos of installations of pH recording and controlling instruments on specific processes in the drying, chemical, food, rubber, petroleum, pulp and paper, textile, water treatment, sewage disposal, and metals fields, as well as detailed drawings on different methods of installing the various instruments for pH measurement. The bulletin features complete pH systems, including the electrode assemblies, ampilifer, and Electronic Dynamaster round- or strip-chart records and controllers in both pneumatic or electric control actions. The new Beckman Model W Amplifier is illustrated and detailed in conjunction with a pH recording and controlling system.....Item 114

PUMP SERVES DEEP OR SHALLOW WELLS—An 8-page, two-color catalog No. 452, issued by Dayton Pump & Mfg. Co., Dayton, Ohio, describes its new line of Rapidayton Super Champ (Series A) jet pumps, designed for both shallow and deep wells. A large cut-a-way illustration reveals the detailed construction of the pump. Sketches show, in 1-2-3 order, how to make up a complete water system with either a one-pipe or a two-pipe jet assembly.....Item 115

PAPER DISCUSSES CORROSION INHIBITORS—Film Forming Corrosion Inhibitors Also Aid Heat Transfer is the subject of technical paper No. 129, prepared by W. H. and L. D. Betz, Philadelphia, Pa. The paper contains many references to the protection afforded by filming amines and the attendant reduction in maintenance costs secured through protection against corrosion.....Item 116

THERMAL HUMIDIFIER—A catalog page describing its thermal humidifier is issued by Flight Mfg. Corp., Camden, N. J. The humidifier is illustrated with a photograph accompanied by a complete physical description.....Item 117

INDUSTRIAL FIRE HOSE—A catalog in color, covering its line of industrial fire hose and fittings, is announced by Boston Woven Hose & Rubber Co., Boston, Mass. The catalog includes construction details and illustrations of the complete line of fire and suction hose, extinguisher tubing, and fire hose couplings. The eight-page folder lists specifications for each type of hose as to size, weight, construction, and working pressures.....Item 118

ELECTRIC MOTOR CATALOG—A new multi-color booklet, 1878, illustrating its 20 principal types of improved motors has been made available by U. S. Electrical Motors, Inc., Los Angeles, Calif. Cut-open views of Varidr've and Syncrogear types are shown in full color. Views of the company's Atlantic and Pacific plants are reproduced in color.....Item 119

INCINERATOR CUTS SMOKE ODORS—A new 6-page folder, in color, describing and illustrating the new model C-2 incinerator for industrial and commercial use is issued by Winnen Incinerator Co., Bedford, Ohio. The folder gives complete information about three different sizes, installation and operation, as well as automatic controls and other optional equipment.....Item 120

METERING TUBE—A 16-page engineering bulletin, 115-L3, on the new Dall Flow Tube is announced by Builders-Providence, Inc., Providence, R. I. The bulletin includes information on: Recovery characteristis, accuracy, applications, range, flow formula, laying length, and working pressure of the device. Also included are sections on: installation, power consumption, effect of approach and downstream piping and fittings, and location of instruments. Tables and graphs are included to aid in selection of the proper flow tube and accompanying secondary instruments.....Item 121

NEW LINE OF VALVES—A new bulletin, No. 110, describing its new line of bronze globe and angle valves, is published by The Kennedy Valve Mfg. Co., Elmira, N. Y.....Item 122

SPEED REDUCERS INTRODUCED IN BULLETIN—Bulletin HW 654, published by Winsmith, Inc., Springville, N. Y., presents its new C line of worm gear speed reducers. Key features and drawings illustrate each of the three designs in the line. Detailed dimension and specification tables cover the final five sizes available to meet requirements within 1/100 to 1 in ratios of 5:1 to 60:1.....Item 123

NEW TUBE AND PLATE FIN COIL—A new catalog offered by Young Radiator Co., Racine, Wis., describes the company's new plate type fin and round tube coil. The catalog, No. 5554, is illustrated with cross-section drawings and points out leading features.....Item 124

WELDING ELECTRODE CATALOG—Complete descriptive information along with application and procedure data on all Murex mild steel and low alloy arc welding electrodes are included in a new 30-page catalog now being offered by Metal & Thermit Corp., New York, N. Y. Designed to be helpful in selecting exactly the right electrode for the job in hand, the new catalog also contains formulas for estimating welding costs, heat treating procedures, hardness conversion tables, and other useful reference material for the welding engineer, metallurgist, and welding foreman.....Item 125

FLEXIBLE SLEEVES—In bulletin SF-1, issued by A & A Mfg. Co., Milwaukee, Wis., are illustrated fourteen ways in which pliable parts can be fabricated from two or more weights of materials to meet specified operating conditions in the design and maintenance of heating and ventilating equipment. The company's Gortite sleeve for high speed flexing is illustrated.....Item 126

LUBRICANT IS SPRAYED ON—Bulletin 162, a two-page, two-color bulletin describing MOLY-Spray-KOTE, a carefully-compounded dispersion of micro-fine solid lubricants, principally molybdenum-disulfide, in a propellant Fluron, has been released by The Alpha Corp., Greenwich, Conn. The bulletin describes this new lubricant in detail and includes a table of prices as well as general specifications and application procedures.....Item 127

FILTER IS ALL ALUMINUM—A catalog describing its aluminum filter is issued by The George Evans Corp., Moline, Ill. The catalog gives the physical and performance characteristics of the filter, as well as a list of specifications. Results of tests appear on the back page of the 4-page catalog.....Item 128

EQUALIZING VALVES AND AIR ELIMINATORS—New literature describing its line of vapor equalizing valves and air eliminators is issued by Gorton Heating Corp., Cranford, N. J.....Item 129

IMPROVED LINE OF FANS—Detailed specifications, performance charts and dimension tables regarding its line of MD fans are contained in bulletin MD-101, published by Chicago Blower Corp., Franklin Park, Ill. The bulletin explains the characteristics of using direct-driven MD fans in such places as restaurant kitchens, boiler rooms, and ventilating of public garages.....Item 130

HEATER NEEDS NO STORAGE TANK—A 4-page brochure, published by Perfex Boiler Co., Brooklyn, N. Y., describes that company's WH series, self-contained, with coil volume water heater line. The brochure shows the characteristics of the instantaneous direct or tankless hot water system and explains several of the features which the heaters embody. Also included are dimensions and capacities for the complete line.....Item 131

PLEASE SEND US MORE INFORMATION. Circle below item numbers on which you wish further information.

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Oct. H-54

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[illegible] FOR LIQUID CHILLERS—Broad [illegible] for air conditioning and refrigeration applications for the line of Acme Flow-Cold packaged liquid chillers are described in a new catalog issued by Acme Industries, Inc., Jackson, Mich. As examples of industrial application, brief histories are given on the use of these complete, small refrigeration machines for controlling solution temperatures in drug manufacture, for cooling welding tips and machine tool coolants, and for process cooling in the food industry. Many other industrial temperature control problems are listed. In addition, the characteristics of a Flow-Cold unit as a central cooling source for the air conditioning of homes, motels, professional clinics and other commercial buildings are discussed. Six models, with capacities from 3 through 15 tons, are detailed in the catalog.....Item 132

[illegible] OF WATER HAMMER—A new engineering data book on the cure and prevention of water hammer at the design level has been published by Wade Mfg. Co., Elgin, Ill. The booklet gives water hammer definitions, causes, problems and methods of solution, a description of the company's Shokstop sealed air chamber, including the characteristics and material specifications of the product. A section is devoted to the curing of water hammer and another to the prevention of water hammer. In addition, an interesting feature of this booklet is a fold-out sizing procedure which enables the architect or engineer to size the devices needed to prevent any water hammer problem before the building is erected.....Item 133

[illegible] LISTS, ELECTRIC MOTOR CONTROLS—Publication of a new 140-page electric motor control catalog is announced by Furnas Electric Co., Batavia, Ill. Primarily divided by major classifications, catalog No. 101 contains engineering and design data including wiring diagrams. Among the more than 2700 items listed are magnetic starters and contactors, combination starters, control panels, drum controllers, master, foot and pressure switches. It contains photographs, descriptions and prices.....Item 134

[illegible] AND METHODS BULLETIN—A 4-page bulletin, No. R541A, entitled For Greater Efficiency, is now available through The Barry Corp., Watertown, Mass. The bulletin discusses the problems of greater utilization of capital equipment and methods of pin-pointing and overcoming sources of inefficient plant and machinery operation. Based on a survey and related research conducted in connection with the company's shock and vibration isolation control work, the bulletin discusses eight steps in attaining efficiency objectives, including: keeping production and assembly lines flexible; keeping maintenance off the production line, and checking the effect on product quality of building-borne vibration.....Item 135

TURBO-PRESSURE BLOWERS—A new bulletin which covers in detail its line of Turbo-Pressure Blowers is issued by Chicago Blower Corp., Franklin, Park, Ill. It contains all the necessary charts and specifications.....Item 136

BULLETIN [illegible] THERMOCOUPLE DATA—A new bulletin No. 4181 issued by Illinois Testing Laboratories, Chicago, Ill., and entitled Alnor Pyrometer Accessories is available in limited quantities to those concerned with installation, use and maintenance of pyrometer systems. Specifications and performance data for Alnor thermocouples of every type and application are thoroughly covered. Also included in the bulletin are notes on thermocouple alloys, temperature-millivolt relationship curves, a comprehensive list of industrial applications, a convenient temperature conversion table, and other valuable information for pyrometer users.....Item 137

CENTRAL STATION AIR CONDITIONING—A new bulletin, No. 654, describing its complete central station air conditioning system for industrial applications is published by Parks-Cramer Co., Fitchburg, Mass. The bulletin describes and illustrates with many photographs, the application of the system in a textile mill, pointing out the effects of the system in the various departments.....Item 138

DATA SHEETS ON FRANGIBLE DISCS—A series of catalog sheets covering the variety of uses offered in the protection of pressure systems by frangible discs is announced by Frangible Discs, Inc., Penns Grove, N. J. The series of catalog sheets, with diagrams and tabular material covering design and dimensions of the frangible discs. Included is a price list and ordering form.....Item 139

CATALOG COVERS COOLING EQUIPMENT—A new catalog covering its line of refrigeration and air conditioning equipment, tools and supplies is issued by Refrigeration Div., Chase Supply Co., Chicago, Ill. The 120-page catalog contains illustrations and all specifications necessary for ordering by mail, and is cross-indexed for ready reference. Helpful engineering data is included, and a separate price supplement accompanies the new catalog.....Item 140

CENTRIFUGAL ROOF VENTILATORS—A new 8-page bulletin, CRV 101, describing and illustrating its line of centrifugal roof ventilators is issued by General Blower Co., Morton Grove, Ill. The bulletin describes the design and features of construction of each of the types and includes a photograph of each type. Tables giving dimensions and specifications on the blowers are included. Operating characteristics are given and a curve chart.....Item 141

SMALL-SIZE BOILERS—A new bulletin, AD-135, describing the recently announced CB50-80 line of small boilers has been issued by Cleaver-Brooks Co., Milwaukee, Wis. The bulletin completely describes these new boilers which are available in 50 to 80 hp (15 to 150 lb steam, 30 lb hot water) for heating and processing. This illustrated bulletin contains complete information on the characteristics of these boilers, including line drawing and tables of specifications.....Item 142

BOILER [illegible] EMPHASIZED—Have You Checked Your Steam Costs Lately? is the title of a 16-page picture and caption presentation published by Orr & Sembower, Inc., Reading, Pa. The first part of the book consists of drawings and captions emphasizing typical boiler plant problems. The latter part of the book illustrates and describes many different types of packaged automatic boiler installations. This is a non-technical presentation of interest to anyone considering the merits of replacing existing boiler equipment or the purchase of new boiler equipment.....Item 143

PACKAGED AIR HEATERS—A catalog giving complete specifications on its line of packaged air heaters is issued by Auto-Therm Mfg. Co., Detroit, Mich. Included in the catalog are specifications, descriptions and detail drawings of gas and oil-fired units with installation drawings and wiring diagrams. An engineering data sheet is included.....Item 144

CATALOG ON CEILING DIFFUSERS—A 70-page catalog, No. 166, covering its entire line of Aerofuse ceiling diffusers has been published by Tuttle & Bailey, Inc., New Britain, Conn. This comprehensive catalog fully describes the entire line including photographs, specifications, selection charts, and engineering data on the diffusers. Also included are construction and installation features of each type, dimension schedules, prices, layout drawings, and design aids.....Item 145

TWO REPORTS ON POLYESTER FILM—Two technical reports concerning Mylar polyester film have been published by the Film Dept., Du Pont De Nemours & Co., Wilmington, Del. One covers the film's physical, chemical, and electrical properties, and the other, the adhesives developed for bonding it to other materials. The technical report on properties (TR-1) contains revised, up-to-date information, complete with charts, diagrams, and tables. Information contained in the technical report on adhesives (TR-2) includes the adhesives recommended for bonding Mylar to other films, foils, papers, and metals.....Item 146

OIL OR GAS-FIRED HEATERS—Bulletin No. 552, describing its line of Parafio warm-air, oil or gas fired space heaters designed specifically for commerical and industrial establishments is offered by Heating Dept., Dravo Corp., Pittsburgh, Pa. The 8-page booklet illustrates design and construction features, shows application and installation information and gives engineering data on these 200,000 or 250,000 Btu per hr heaters.....Item 147

VALVE CATALOG—A new complete valve catalog for plumbing and heating contractors is issued by Hammond Brass Works, Hammond, Ind. The catalog presents a number of new valve items in addition to the company's regular line of valves. Each valve is completely described with standard sizes listed and service recommendations. A large illustration of each valve also appears with the descriptive material. Catalog sections include: radiator valves and elbows for steam and gravity hot water heating systems; circulating valves, balancing elbows and fittings for forced hot water heating systems; globe, angle and drainable globe stop valves; boiler drain and sill faucets; gate and check valves for iron pipe and copper tubing; and dimensions.....Item 148

FAN ADDED TO LINE—The new type J fan is described in a new 44-page bulletin No. 2500, issued by Robinson Ventilating Co., Zelienople, Pa. The bulletin contains a thorough description of the construction and classes of type J fans. Capacity tables are given for a wide range of fan sizes. A performance curve indicates the general operating characteristics of the type J fan. The bulletin also contains dimension tables for the fan in all of the standard arrangements, together with photographs of typical fan assemblies.....Item 149

WATER [illegible] EQUIPMENT—[illegible] Equipment for Control Water Analyses is a new 12-page bulletin just published by W. H. & L. D. Betz, Philadelphia, Pa. Designed for use as a guide in the selection of water testing equipment, this bulletin describes the company's complete line of titration stands, test sets, cabinets; the Conducto Bridge, colorimetric comparators; and photometers.....Item 150

INDUSTRIAL CLAY PIPE—An illustrated four-page bulletin showing special uses of Screw-Seal Clay Pipe for industrial installations has been published by Vitrified Products Div., The Robinson Clay Product Co., Akron, Ohio.....Item 151

THERMOSTATIC TEMPERATURE REGULATORS—A 12-page catalog, Bulletin S-6, covering its Type S thermostatic temperature regulator, is issued by Lawler Automatic Controls, Inc., Mt. Vernon, N. Y. A comprehensive engineering bulletin on the subject of thermostatic temperature regulators, the catalog explains where and when to use Direct Acting, Reverse Acting and Three Way type thermostatic temperature regulators and lists typical engineering specifications. Also explains where and how to use single and double seated valves. Illustrated with cutaway photos and diagrams, installation diagrams and engineering tables, this bulletin gives complete information on temperature ranges, installation musts, capacities and steam flows per hour....Item 152

CATALOG ON COOLING TOWERS—The question, How do cooling towers save you money? is answered in a new catalog on Flow-Cold cooling towers, recently published by Acme Industries, Inc., Jackson, Mich. Five models of the company's cooling towers are illustrated and described in the new catalog and complete dimensions are given. A selection procedure is given to enable the user to pick the model of tower best suited to his purposes.....Item 153

AUTOMATIC BOILERS—A 4-page bulletin describing the operation and characteristics of its Continental automatic boiler's Spinning Gas Technique is offered by Boiler Engineering & Supply Co., Inc., Phoenixville, Pa. The bulletin shows cutaway view of the boiler construction; illustrates hinged doors and shows the method of injecting air through static vanes into the burner.....Item 154

CATALOG COVERS INDUSTRIAL PUMPS—A new 40-page catalog, 53-CI, showing its full line of condensation return, boiler feed and industrial pumps has been published by Decatur Pump Co., Decatur, Ill. Condensation return and boiler feed, single-pump and duplex-pump systems are shown both in factory-assembled systems and as components that can be assembled on the job. Full performance characteristics are shown for each system and pertinent engineering information is included in the back of the catalog. Information inside the back cover clarifies the difference between condensation return and boiler feed installations as well as the facts needed in specifying the correct system, while the facing page shows typical installations.....Item 155

BULLETIN ON VERTICAL PUMPS—To describe and illustrate its two types of vertical, encased, close-coupled pumps for the handling of hydrocarbons, hot or cold water, mild acids, basic and salt solutions, Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif., has just issued a new bulletin titled Hydro-Line Pumps. In addition to explaining the characteristics of encased, vertical, close-coupled pumps, the bulletin completely documents and illustrates the construction features of both a process type vertical can pump and a transfer type vertical can pump and points out where each may be applied.....Item 156

GUIDE TO MASTIC COATING—An illustrated discussion of the various types of asphaltic mastic protective coatings available for use on masonry, brick and concrete sidewalls, roofs, storage tanks and process equipment of factories, plants and warehouses has been made available by Emjay Maintenance Engineers, Rutherford, N. J. A chart listing the types of mastic coatings designed to meet the different industrial plant specifications and conditions of service is included together with a cutaway drawing of a typical plant with footnotes containing recommendations for the types of mastics to be used on interior and exterior structural surfaces as well as on special equipment. The article also summarizes the steps to follow in selecting mastics.....Item 157

NEW SERIES OF SALES BULLETINS—A new series of bulletins reflecting the company's latest sales promotion motif of white clouds against a sky background is issued by Airtemp Div., Chrysler Corp., Dayton, Ohio. Three of the bulletins describe the company's residential waterless cooling systems including illustrations and specifications for the units available, and another describes the company's packaged central station air conditioning equipment for larger jobs.....Item 158

GENERAL PURPOSE PUMPS—A bulletin, No. 212, describing its model B and model BB general purpose pumps for industry is issued by Carver Pump Co., Muscatine, Iowa. The bulletin fully describes the pumps giving applications, features of construction, performance characteristics and selection tables. Photographs of the pumps are included.....Item 159

HOT EXTRUSIONS—Its first literature describing the new hot extruded shapes it is offering in stainless, tool steels, high temperature alloys, and other steels is released by Allegheny Ludlum Steel Corp., Pittsburgh, Pa. The leaflet describes the characteristics of purchasing extruded shapes that can be closer to finish sizes than for regular hot rolled materials, reduced scrap losses, advantages in small quantity production, and the physical characteristics of the extruded shapes. Illustrations of shapes already produced are also included.....Item 160

BOOKLET ON ELECTRONIC CONTROLS—A new 24-page booklet (The Electronic Control Story, F-6437, published by Barber-Colman Co., Rockford, Ill., is available to aid in understanding the fundamentals of electronic temperature controls and their application. Dealing with the basic elements of electronic control the following points are thoroughly explained: the bridge circuit, sensing elements, type of control, and control applications. In addition to proportioning temperature control this booklet delves into on-off temperature control, humidity control, and outdoor reset control.....Item 161

FLOW CONTROL VALVES—A new bulletin W8-A, issued by Golden Anderson Valve Specialty Co., Pittsburgh, Pa., describes that company's flow control valves. The bulletin contains technical information on application, design, flow, construction, and service of this valve as well as cut-away drawings of the various types offered. Each of the drawings is accompanied by a parts list and table of dimensions.....Item 162

BULLETIN ON DUST CONTROL—How to control dust in the manufacture of rubber goods is discussed in a new bulletin, 442, published by American Wheelabrator & Equipment Corp., Mishawaka, Ind. This bulletin gives case histories of three different companies, showing how dust conditions are prevented using local exhaust ventilation in which the company's Dustube cloth-tube-type dust collectors are employed. The bulletin explains the importance of product recovery, as well as the improvement of working conditions in the plant.....Item 163

PACKAGE BOILER CONTROLS—Specifications for its fully automatic, all electric metering type packaged control for shop assembled boiler are given in a four-page bulletin, No. 54-1088-230, issued by The Hays Corp., Michigan City, Ind. A schematic drawing is included, showing a typical packaged control system for a combination boiler.....Item 164

AUTOMATIC LEVELING INSTRUMENT—A 4-page, 2-color folder covering its new automatic leveling instrument is issued by Compactic Div., Engis Equipment Co., Chicago, Ill. The folder describes the use of the device and covers the operation and characteristics.....Item 165

CATHODIC PROTECTION BOOKLET—A booklet covering the whys and hows of cathodic protection is announced by National Carbon Co., Division of Union Carbide and Carbon Corp., New York, N. Y. The 12-page catalog section is a reference work on the mitigation of corrosion of underground and submerged metal structures by the application of an impressed current cathodic protection system using National graphite anodes. The booklet contains information on the cost of corrosion; the economics of cathodic protection; where and when it can and should be applied; facts about impressed current systems and how they should be installed; typical ground bed installation details including design notes and tabulation of material requirements. Liberally illustrated the booklet also contains engineering sketches and aids, and typical curves showing ground bed to structure resistance.....Item 166

CATALOG LISTS CONTROLS—A new controls catalog has been released by Robertshaw Corp., Milwaukee, Wis. The catalog furnishes up to date information regarding controls and incorporates many new products, improvements and designs. Handy product information and how-to-select data is provided.....Item 167

HEAT EXCHANGER CATALOG—A complete description of the company's Type "F" fixed tube bundle heat exchangers is given in a newly revised Catalog No. 124, issued by Young Radiator Co., Racine, Wis. The 12-page two-color catalog also contains application photographs covering a wide range of industries. It includes materials and construction features, dimension drawings and tables. Approximately four pages of the new catalog are devoted to a simple yet complete guide to heat exchanger selections. This data includes all necessary tables and formulas for selecting exchangers involving the most common cases of water-to-water and water-to-oil heat transfer.....Item 168

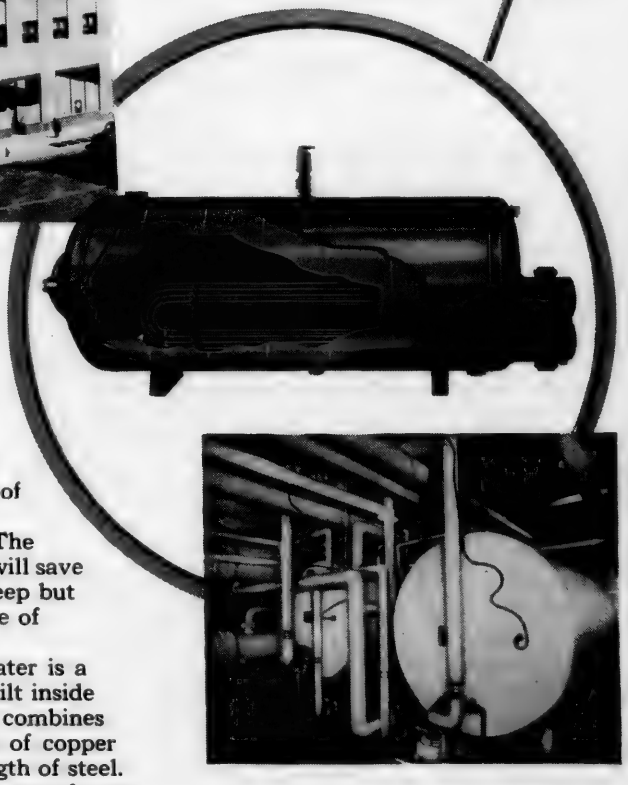
WATER SYSTEM CATALOG—A water system catalog has been completed by A. Y. McDonald Mfg. Co., Dubuque, Iowa. All current products of the company's pump division, including integral horsepower jet pumps, centrifugal pumps and submersible pumps are included in the new catalog.....Item 169

STRAINERS AND RELIEF VALVES—Catalog section 12-T on relief valves and strainers, which includes its newly designed union bonnet strainers is published by Edward Valves, Inc., East Chicago, Ind. This publication replaces Edward Relief Valve Bulletin 504 and Strainer Bulletin 505. Besides dimensions and design details for forged steel strainers and relief valves, this catalog section contains tips on the installation and maintenance of these specialties.....Item 170

for Rust-Free Hot Water

look for the
Copper Lining

they did at
DUN and BRADSTREET



Copper-lined water heaters manufactured by **p-k** are a sound investment, especially for big, modern buildings such as the Dun and Bradstreet building. In their new office building at 99 Church Street in New York City, these copper-lined storage heaters supply 180 deg. F. water for the cafeteria and 130 deg. F. for general use. An abundant supply of rust-free hot water is constantly available at the turn of a spigot. The flawless operation of the heaters will save money—not only in heater upkeep but also in the proper maintenance of building services.

The **p-k** copper-lined heater is a complete copper heater built inside of a heavy steel shell. It combines non-corrosive properties of copper with the superior strength of steel.

For an unfailing source of pure, rust-free hot water—

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Abstracts AND Reviews

Publications abstracted in this department should be ordered direct from publisher.

GRAPHICAL SOLUTIONS

Simple, graphical solutions of many engineering problems that may confront the plant engineer are made possible through he use of Plant Engineers Easy Problem Solver, by Louis J. Murphy. Over 200 nomographs and charts are presented for solving problems in a number of fields.

Graphical methods of solution are presented for special problems in metal working, heating, ventilating and air conditioning, refrigeration, pumps and pumping equipment, compressed air, vacuum systems, mechanical power transmission, materials handling, industrial waste treatment, internal combustion engines, oil and gas calculations, liquid storage tanks, plant safety data, and plant maintenance. A few of the charts dealing with refrigeration were originally published in HEATING AND VENTILATING.

The author claims results obtained from using the charts are as accurate as solution of problems through the use of a 10-inch slide rule. Where a more accurate answer is required, the charts provide a handy check of the computed solution.

Text material is short and easy to follow. Charts in the book are for the solution of problems actually met in industry. Each subject treated has a nomograph or chart, and an illustrative problem to show how the answer can be obtained through graphical means.

Plant Engineer's Easy Problem Solver, by L. J. Murphy. Cloth bound, 6 x 9 inches, 355 pages. Published by Conover-Mast Publications, Inc., 205 E. 42nd St., New York, N. Y. Price, $6.

ENGINEERING THERMODYNAMICS

The experience of a large number of teachers who used the first edition of Principles of Engineering Thermodynamics has been used as a guide in the preparation of the second edition of this text for the engineering student. The authors are Dr. Paul J. Kiefer, professor of mechanical engineering, U. S. Naval Postgraduate School; Dr. Gilbert Ford Kinney, professor of chemical engineering, U. S. Naval Postgraduate School; and Milton C. Stuart, professor of mechanical engineering, Lehigh University.

Almost completely rewritten, the new edition is the result of many years of development work. It covers the advances that have been made in the field of thermodynamics since the first edition was published.

This book is intended to be used by the engineer as well as the engineering student. The subject is covered so well that the teacher may find that some of the material may be beyond the needs of the undergraduate student.

After covering energy and its equations, it has chapters on properties of fluids, ideal gases, low pressure gas and gas-vapor mixtures, non-ideal gases and vapors, thermodynamics of combustion, condensing fluids and non-condensing fluids; heat pump and refrigeration cycles, flow of compressible fluids, and dynamic forces.

Principles of Engineering Thermodynamics, by P. J. Kiefer, G. F. Kinney and M. C. Stuart. Cloth bound, 6 x 9 inches, 539 pages. Published by John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y. Price, $7.75.

MANUAL FOR PLASTIC WELDING

An manual confined to the gas welding of plastics and covering polyethylene has been prepared by G. Haim, of Rediweld Ltd., Crawley, Sussex, and J. A. Neumann of American Agile Corp., Bedford, Ohio. Manual for Plastic Welding is the second book in a series on welding of plastics and is to be followed by a book of the same title but devoted to polyvinylchloride.

This book is a practical presentation of information regarding gas welding, plus some theory. The authors have planned the book to be of value to practical welders and to engineers who intend to incorporate plastic materials into their design.

Manual for Plastic Welding—Vol. II, by G. Haim and J. A. Neumann. Cloth bound, 5½ x 8½ inches, 128 pages. Published by Industrial Publishing Company, 1240 Ontario St., Cleveland 13, Ohio. Price $6.

FIELD PRACTICE

Field Practice, by Elwyn E. Seelye is a data book for civil engineers designed to provide the field engineer or inspector with information to enable him to carry out his job. This is a revised second edition of a book first published in 1947 and forms Vol. 3 of a three-volume set Data Book for Civil Engineers. Volume 1 covers design, Vol. 2 specifications and costs, and Vol. 3 on field practice.

Material in the book is grouped into two main parts—inspection and surveying. The volume offers checklists, checking procedures and background information on materials and methods of construction.

The author is senior partner of Seelye Stevenson Value & Knecht, a well known firm of consulting engineers.

Field Practice by E. E. Seelye. Flexible binding, 4½ x 8 inches, 394 pages. Published by John Wiley & Sons, 440 4th Ave., New York 16, N. Y. Price, $7.50.

PIPING FLEXIBILITY

Results of more than twenty years' experience are contained in Practical Pipe Flexibility—Design and Flow, by W. A. Thomas consulting engineer, Chemical Plants Division, Blaw-Knox Company. It is designed to be of value to engineers responsible for the analysis of thermal stress

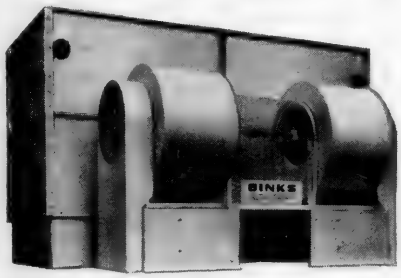
(*Concluded on page 136*)

"PACKAGED" COOLING TOWERS—THE ANSWER TO LOW-COST OPERATION

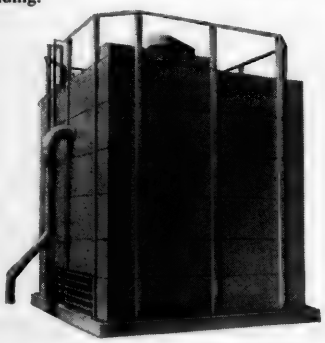
The growing use of cooling towers as a part of all air conditioning systems has made it possible to produce towers by mass production methods. These "packaged" units are superior in many ways to the former custom-made towers because they are better designed and thoroughly factory-tested under varying conditions.

Above: Binks Type "H" Series—widely used for refrigeration and air conditioning. Capacities range from 4 to 40 tons.

Below: Binks 3BB Series Multiple Blower Cooling Towers—Capacities range from 40 to 125 tons.

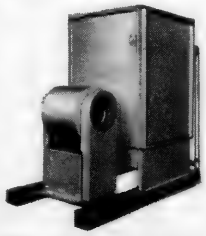


Packaged towers come in both natural and mechanical draft models...ranging from small, extra quiet towers for indoor use in residential air conditioning systems to larger towers capable of serving an entire building.



Above: Binks 2-K Series Induced Draft Cooling Towers. Capacities up to 800 tons.

Below: Binks 3-B Series Single Blower Cooling Towers. Capacities range from 5 to 36 tons.



One of the most complete lines on the market today is offered by the Binks Manufacturing Company, pioneers in this field. Binks engineers will help you select the right tower for any particular installation, upon receipt of information regarding local conditions, tonnage requirements, and cooling range required. 3120-38 Carroll Avenue, Chicago 12, Illinois.

ADV.

New Residence Cooling Tower Cuts Air-Conditioning Costs

Saves 95% on cooling tower bills...today a cooling tower is a must in every air conditioning installation involving water cooled condensing units. Homes are no exception. In many communities the use of water for this purpose is restricted. In others high water rates result in excessive operating costs. A Binks Residence Cooling Tower makes it possible to cool and recirculate the condensing water...at a tremendous saving.

HERE'S WHY you will prefer Binks residential towers:

1. **Quiet operation!** Noiseless, squirrel-cage type blower supplies ample air movement at operating speeds far below the noisy propeller-type fans used in conventional cooling towers. All metal-to-metal connections are rubber cushioned. Interior surfaces are protected and soundproofed with heavy undercoating.

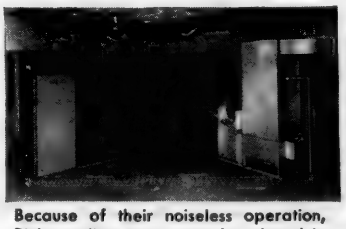
2. **Compact!** Fits into small space...in basement, garage, breezeway, out-doors.

3. **Easy to install!** Comes fully assembled ready for immediate water, electric and duct connections.

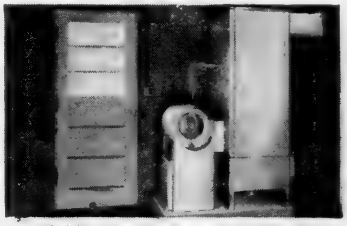
4. **Low maintenance!** All metal surfaces are heavily galvanized and given several coats of good paint. Construction is rigid. Nozzles are clog-proof. No moist air reaches the air propulsion mechanism.

5. **Efficient!** Binks' 25 years experience in the development and manufacture of successful commercial towers assures correct design and high efficiency for this residence tower.

6. **Attractively priced!** These towers are mass produced for economy.



Because of their noiseless operation, Binks cooling towers can be placed in utility or recreation rooms.



Available space in garage, carport or breezeway can be used.

Send today for free Bulletins 47-B and 47-D which describe Binks Residence Cooling Towers in refrigeration capacities of 2 and 3 tons.

MAIL COUPON NOW

Binks

EVERYTHING FOR [illegible] WATER COOLING

Binks Manufacturing Company
3120-38 Carroll Avenue, Chicago 12

Gentlemen: Please rush FREE Cooling Tower Bulletins 47-D and 47-B } and other facts including prices.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

(*Concluded from page 134*)

and reactions in piping systems. It gives a new method for rapidly checking by graphs and charts, the maximum thermal stress and reactions in piping arrangements between two anchors, with practically no calculations. A preliminary Criterion Chart is included to determine whether the system is possible and worthy of further analysis. The piping system to be checked is then selected from an extensive table of key shapes, and the coefficients obtained from the table are used in two master charts to find the maximum stress and the reactions.

Also included in the book are sections on related subjects such as flow of liquids, economical pipe size, pumping data, and flow of steam.

Subjects are treated in such a way as to permit the user to apply time-saving features to commercial problems. The author has tried to avoid duplication of otherwise available material.

Practical Pipe Flexibility—Design and Flow, by W. A. Thomas. Flexible loose leaf ring binder, 5½ x 8½ inches. Published by the author, 2742 Philadelphia Ave., Pittsburgh 16, Pa. Price, $25.

PLANT MAINTENANCE AND ENGINEERING

At the Fifth Plant Maintenance and Engineering Conference that was held in Chicago concurrently with the 1954 National Plant Maintenance and Engineering Show, a number of papers were presented, sectional conferences held, and round table discussions promoted.

The prepared papers, transcripts of the questions and answers that followed these presentations, and summaries of the twenty round table discussions are contained in Techniques of Plant Maintenance ad Engineering—1954. This makes available in one volume, the large amount of useful information presented at this conference.

Techniques of Plant Maintenance and Engineering—1954. Cloth bound, 8¼ x 11 inches, 291 pages. Published by Clapp & Poliak, Inc., 341 Madison Ave., New York, N. Y. Price, $6.

• • •

INDUSTRIAL HYGIENE FOUNDATION CONFERENCES—Transactions of the eighteenth annual meeting of the Industrial Hygiene Foundation of America held at Pittsburgh, Pa., November, 1953 are now available as Transactions Bulletin No. 27. Included are the five papers presented during the Engineering Conference, and material at the conferences devoted to medical, legal, joint medical-legal and chemical-toxicological. Industrial Hygiene Foundation of America, Mellon Institute,: 4400 Fifth Avenue, Pittsburgh 13, Pa. Price, $3.

CORROSION OF HOT WATER STORAGE TANKS—Following a study conducted at Case Institute of Technology under the sponsorship of American Gas Association's Domestic Gas Research Project, the findings of this research are now available in a report on Corrosion of Galvanized Steel Hot Water Storage Tanks as a Function of Some Service Variables. The investigation included a study of the effect of the quantity of hot water heated, the rate of heating water and temperature of the stored water on the corrosion rates of galvanized steel gas hot water heaters. The rate of heating and the quantity of water heated did not have appreciable effects but the temperature of the stored water was a significant factor. American Gas Association, 420 Lexington Avenue, New York 17, N. Y. Price, $1.00.

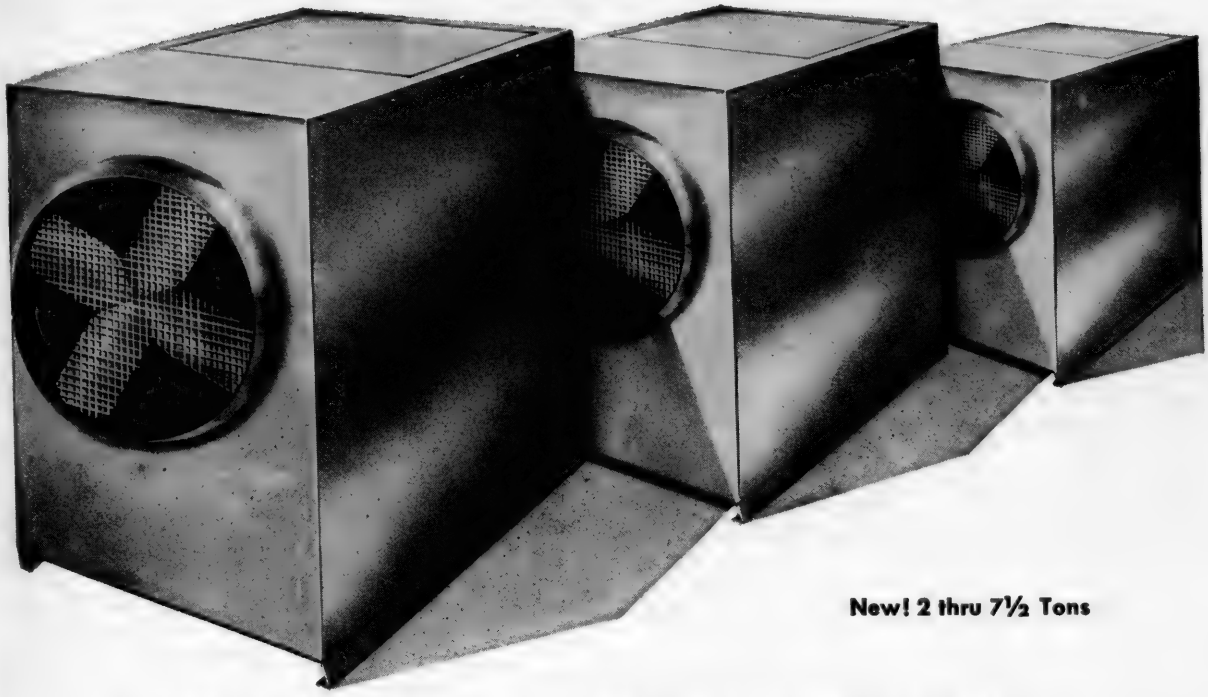
HEAT EXTRACTION—A booklet, Frontiers in Heat Extraction From the Combustion Gases of Coal, has been prepared by Elmer R. Kaiser, associate director of research, Bituminous Coal Research, Inc. It presents information on the heat-release rates of boiler furnaces, heat-absorption rates of the various parts of the boilers, and the effect of boiler design on ash behavior. By cooling the flue gases below 300F in an effort to increase efficiency, problems are experienced with acid corrosion and deposits in air preheaters. Bituminous Coal Research, Inc., 2609 First National Bank Building, Pttsburgh 22, Pa. Price, 25 cents.

SPECIFICATIONS FOR STEEL PIPING MATERIALS—ASTM Committee A-1 on Steel has issued ASTM Specifications for Steel Piping Materials. It contains all the specifications for carbon-steel and alloy steel pipe and tube issued by the American Society for Testing Materials through this committee. The book also contains specifications for pipe material used in castings, forgings, bolts and nuts. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, $3.75.

EXCESSIVE MOISTURE IN HOMES—The use of more appliances in houses, as well as the usual heating units has led to excessive moisture and its consequent damage in many houses, such as paint failure, mold and mildew, stains on walls and ceilings, and swollen doors and windows. While homes built forty years ago were generally far from air tight, modern building methods and materials have resulted in almost air tight structures. Bulletin Series No. 82 has been issued by Purdue Engineering Extension Department, Lafayette, Ind., on Excessive Moisture in Homes. It discusses the sources of moisture in homes, the damage and nuisance that excessive moisture can cause, and the methods that have been successful in solving many moisture problems.

ALUMINUM DATA BOOK—A 220-page book with spiral ring binding, offers detailed data on the properties and characteristics of aluminum. There are sections devoted to high purity aluminum, physical data, chemical, mechanical, tolerances, weights, and availability showing grades manufactured and details regarding products. New information presented for the first time are radioactive isotopes of aluminum, thermal neutron absorption cross sections for various metals and elements found in commercial aluminum. Sent free to engineers, technical men and executives who write on company letterhead to Reynolds Metals Company, Desk PR, 2500 S. Third St., Louisville 1, Ky.

RESIDENTIAL COOLING TOWERS



New! 2 thru 7½ Tons

ONLY HALSTEAD & MITCHELL OFFERS THE

20-Year Guarantee!

ON THE WETTED DECK SURFACE

PRICED FOR THE HOME MARKET

Price-wise these Halstead & Mitchell Residential Cooling Towers throw open huge segments of the home and small building market to air-conditioning. Here is the development for which the industry has been waiting. Check prices today!

NOW REQUIRED IN MANY AREAS

Residential Cooling Towers recirculate precious water . . . meet requirements of municipalities which prohibit wasting cooling water to sewers. And low cost H&M units take residential air conditioning to the suburbs and rural area . . . recirculate from a cistern if need be!

MADE FOR REAL OPERATING ECONOMY

Economical, lastworthy . . . low operating cost matches low initial cost. Efficient gravity-type distributing pan eliminates windage loss since atomizing by spray nozzle is unnecessary. Low pump head pressure is another bonus of gravity distribution. And maintenance is a snap!

FAMOUS HALSTEAD & MITCHELL QUALITY

Here's *all* the quality for which Halstead & Mitchell Cooling Towers are world famous — including the 20-year Guarantee on the wetted deck surface of pressure-treated creosoted wood, against attack by rotting or fungi growth. Stainless steel fans and shafts, plus individual cabinet coatings of Vinsynite, Vinyl Zinc and chlorinated rubber add important years of life. The complete assembly is with Everdur bolts . . . disassembly is easy even after years of service.

AT LEADING WHOLESALERS EVERYWHERE

Write for descriptive bulletin from Halstead & Mitchell, one of the world's largest manufacturers of water-cooled Cleanable Condensers, and Cooling Towers up through 100-tons.

Halstead & Mitchell

OFFICES: BESSEMER BUILDING • PITTSBURGH 22, PA.

NEWS OF THE MONTH

AIR CONDITIONING SALES

reported in Census release showing distributors' estimated dollar volume, bad debt losses, expenses.

Sales of merchants primarily engaged in selling air conditioning and commercial refrigeration equipment in the United States were estimated at $755 million in 1953, it was announced in a preliminary August release of the Census Bureau's 1953 Annual Wholesale Trade Report. Sales during 1953 were up 150% over the $310 million recorded in the latest complete Census of Business covering the year 1948, and were up 8.5% over the 1952 level.

• **OUTLETS.**— The number of establishments operated by merchants primarily engaged in selling air conditioning and commercial refrigeration equipment and supplies increased from 1,409 in 1948, the year of the latest Business Census, to 1,998 at the end of 1953. As the total volume of sales increased relatively more than the number of establishments, 1948 to 1953, annual sales per establishment increased considerably. Operating expenses—including payroll but not the cost of merchandise—totaled $138 million in 1953, or 18.3% of sales. The 18.3% expense ratio represented a decrease from the 23.4% in 1948.

• **CREDIT.**—Accounts and notes receivable derived from credit sales amounted to $88 million at the end of 1953, or 12.1% of the 1953 sales of those doing a credit business. Bad debt losses—receivables written off as uncollectible—during 1953 amounted to 0.40% of sales. Stated differently, bad debt losses amounted, on the average, to 40 cents per $100 of sales of distributors doing a credit business. This ratio was lower than in 1948 when bad debt losses amounted to 43 cents per $100 of sales. End-of-1953 stocks were valued, at cost, at $118 million, or 15.6% of annual sales.

• **BASIS.**— The term "air conditioning and commercial refrigeration distributors," as used in this report, includes merchant wholesale establishments primarily engaged in selling commercial refrigeration equipment (including electrical), such as refrigerators, display cases, dispensers, water coolers, food locker equipment; and those selling air conditioning and ventilating equipment and supplies, including fans, blowers, and accessories. Establishments specializing in the sale of refrigeration components and accessories are also included.

AIR CONDITIONING: COMMERCIAL REFRIGERATION EQUIPMENT DISTRIBUTORS

Item	1953	1948
Number of establishments	1,998	1,409
Sales, entire year (millions of dollars)	$755	$310
Operating expenses:		
Amount (millions of dollars)	$138	$73
Percent of sales	18.3	23.4
End-of-year receivables, percent of annual sales	12.1	12.7
Bad debt losses, percent of sales	0.40	0.43
Credit sales, percent of total sales	92.1	84.0
End-of-year stocks, valued at cost:		
Amount (millions of dollars)	$118	$48
Percent of annual sales	15.6	15.5

The 1953 data in the release are based upon sample reporting and—except for those without paid employees—represent all sizes of air conditioning and commercial equipment distributors, all forms of ownership and organization, and all parts of continental United States.

This preliminary release is one of a series presenting the findings of the 1953 annual wholesale trade survey, the first of its kind conducted by the Bureau of the Census. A more complete report of the findings will be published in a Census bulletin entitled "Annual Wholesale Trade Report: 1953." In addition, annual reports on retail and service trades are being published. The preliminary report is summarized in the table.

SNOW MELTING SYSTEM

for sidewalks and hangar doors at Worcester airport uses heat transfer oil in iron pipes.

The usual cold weather hazards to safe walking have been eliminated in three separate sidewalks serving the new Worcester, Mass., airport's administration building and control tower by embedding snow melting systems of wrought iron pipe coils in the concrete pavement. Sidewalks are heated by circulating heat transfer oil through the pipe coils to keep the surface clear of ice and snow.

Two of the sidewalk heating systems are installed in the pavement between the building entrance of the administration building and the street. One serves a sidewalk 12-feet wide and 24-feet long, the other a walk 10-feet by 220-feet. The third system is embedded in an area of pavement that leads from the administration building to the aircraft parking apron.

Snow melting systems also serve two other hangar buildings in which pipe coils are embedded below the tracks of large sliding door areas measuring 150 feet long and five-feet wide. In these installations snow melting prevents the big doors from becoming clogged with snow and ice to facilitate plane-maintenance.

INSULATION TESTS

show fire resistance of commercial types of pipe insulation samples exposed to gas flame.

Tests on commercial types of thermal insulation were conducted recently by the Technical Committee of The Magnesia Insulation Manufacturers Association, to determine the value of 85% Magnesia thermal insulation as a protection against fire.

• **ENVELOPE OF FIRE.**— The tests were carried out with empty 6-ft lengths of 3-inch standard steel pipe covered with one inch of insulation. Chromel-alumel thermocouples cemented at the top and bottom of the pipe under the insulation showed the amount of temperature increase at the pipe surface. The pipe was supported horizontally in a test stand about 10 inches above the orifice of a burner firing a mixture of compressed air and manufac-

(*Continued on page* 140)

BARBER COLMAN

"UNI-FLO" ENGINEERED

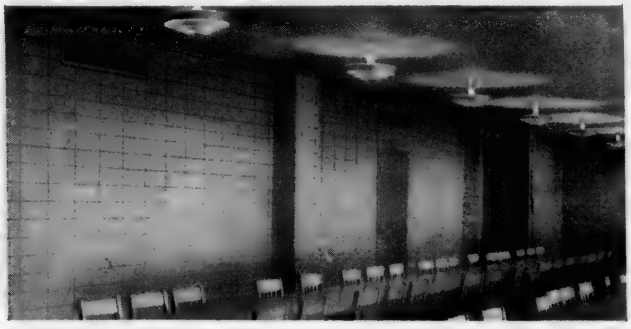
Air Distribution

. . . provides comfort for mental patients at huge Indiana institution . . .

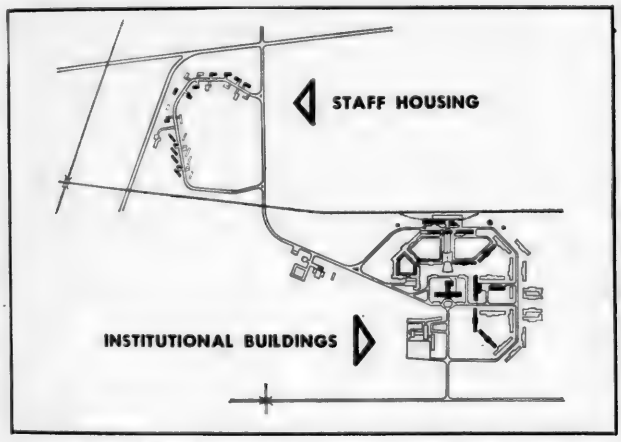
Nearing completion at Westville, Indiana, is one of the world's largest institutions for the mentally ill. Since 1949 most of the thirty-four large buildings, plus staff residences, have been constructed at a total cost of nearly $25,000,000. The institution contains a small city within itself with provision for housing, feeding, working, and recreational facilities for 3,250 patients and 450 employed personnel. Air distribution in most of the project has been engineered with Uni-Flo equipment to assure comfort conditions for the patients and staff members. Over 2,500 pieces of Uni-Flo equipment have been specified or installed in various buildings.

Architects, Engineers, Interior Designers: Boyd E. Phelps, Inc., Michigan City. *General Contractors:* Tonn & Blank, Michigan City; E. H. Marhoefer, Jr. Co., Permanent Construction Company, and Gordon & Company, Chicago. *Ventilating Contractors:* Troeger Sheet Metal and Zack Incorporated, South Bend; Industrial Sheet Metal, Hammond; Reliable Sheet Metal, Chicago.

Disturbed Unit houses violently insane patients. Uni-Flo Sidewall Diffusers in soffit distribute air quietly and uniformly. Each Diffuser is furnished with tamperproof screws.



Aged and Infirm Unit has dining area handling eighty patients at one time. Facilities are available for serving eight hundred patients in various units simultaneously. Uni-Flo Sidewall Diffusers are installed high on the walls.



Huge size of project is indicated by sketch. Included are dormitories, a hospital, laundry, kitchens, auditorium, greenhouses, occupational and recreational units, cold storage, warehouses, power and sewage plants, plus a separate personnel building and individual staff residences.

Spacious Auditorium has every modern facility for musical therapy treatments, plus entertainment of patients. Venturi-Flo Ceiling Diffusers (individually adjustable) provide a healthful, comfortable, draft-free atmosphere without distracting air noise.

BLAZING THE TRAIL *TO BETTER AIR DISTRIBUTION*

First to publish reliable data . . .

Performance data on air distribution equipment was meager and incomplete just twenty years ago. Pioneer work on this subject in the Barber-Colman laboratories was the basis for comprehensive engineering data, now time-proved and widely used to determine, in the layout stage, the exact requirements for any desired conditions.

Research, development, and testing facilities are fundamental requirements and the responsibility of manufacturers to assure progress in the field of air distribution. Complete information about Barber-Colman's reliable selection data is available from our nearby Field Office (consult phone directory) or by writing us.

BARBER-COLMAN COMPANY, Dept. J, 1102 Rock St., ROCKFORD, ILL., U.S.A.

INSULATION TESTS

(*Continued from page* 138)

Test setup with gas flame striking insulation.

tured gas which enveloped the insulation in its flame. An 8-gage chromel-alumel thermocouple gave temperature readings for the flame jet at a point one inch below the insulation. A temperature of 2000F was maintained within a range of ±20F, until the bottom surface reached 1000F, taken as the point of insulation failure. If this temperature was not attained, the test was concluded after two hours.

• **RESULTS.**— The association reported that at the end of the two-hour period the pipe insulated with canvas-jacketed 1-inch thick 85% Magnesia showed a bottom pipe surface temperature of 593F, and a top surface temperature of 501F. This was the lowest pair of temperatures noted. It was concluded that the results showed a marked ability of 85% Magnesia insulation to protect pipe lines, flues, ducts, and other equipment from fire damage, regardless of the type of jacket used.

POWER SHOW

to include special events. Symposium, field trip planned. Boilers, motors included in exhibits.

A series of special events is being planned in conjunction with the 21st National Exposition of Power and Mechanical Engineering at Philadelphia, December 2 to 7. On the program will be papers and discussions of interest to visiting engineers including those attending the annual meeting in New York of the American Society of Mechanical Engineers, under whose auspices the exposition in Philadelphia's Commercial Museum will be held.

• **FIELD TRIP.**—Of particular interest to ASME members will be plans now being developed for an inspection trip from the Annual Meeting in New York to the Power Show via the Fairless Works of U. S. Steel Corp. on Friday, December 3rd. On Monday, December 6th, there will be a joint meeting of the Philadelphia Chapters of the American Society of Mechanical Engineers and the American Society of Civil Engineers at Convention Hall.

• **SYMPOSIUM.**—Another timely event will be an all-day symposium on automation to be held by the Instrument Society of America, December 3, covering such topics as trends, new problems created by automation, automatic intelligence gathering systems, and an analysis of the engineering control loop. Another event already announced is a dinner meeting of the Plant Engineers Club of Greater Philadelphia, to be held at the show Thursday, December 2.

• **MANY EXHIBITS.**—A fast-growing list of exhibits scheduled for first showing at the exposition accumulated during the summer, as some 250 manufacturers completed arrangements for their displays. A sampling of specifications for "first time" exhibits includes an autolog which records operating performances at as many as fifty trouble points in plant operation, an electric boiler of British origin, and a noteworthy new exhibit described as affording a more lucid presentation of the advantages of seamless manufacture of steel pipe and tubes.

• **MOTORS.**—From an English source will come the first U. S. exhibit of a line of high grade electric motors, built to NEMA as well as British standards. Several new automatic variable-speed electric motor drives will be exhibited, at least two of which employ pneumatic means of regulation. One pneumatic control operating under 60 to 100 psi, is positively positioned by a piston having both sides under working pressure and regulated by a pilot valve under 3 to 15 psi signal pressure. This system not only permits remote manual speed control, but offers regulation of a variety of dependent speed functions, to maintain speed constant with, or proportional to pressure; or speed regulation with respect to temperature, liquid level, rate of flow, or even conveyor delivery of dry materials.

• **BOILERS.**—An established manufacturer of packaged boilers will show for the first time a boiler that is new in design and construction, introduced just this year. It is smaller in size than its predecessors, but with four-pass construction, affords 5 sq ft of heating surface per boiler, assuring a minimum guaranteed efficiency of 80%. Another exhibitor showing a line of steam power packages will feature a mercury-filled thermostat "unlike any other", which is not only accurate, but vibration resistant. There is also a new tube expander with taper rolls of proper length to roll tubes closely spaced in thin tube sheets, as in packaged boilers.

GIANT VALVE

to control the flow of air in world's most powerful supersonic wind tunnel now under construction.

A giant-sized butterfly valve to control the flow of air soaring through the free world's most powerful supersonic wind tunnel at speeds up to 3½ times the speed of sound has been delivered to the National Advisory Committee for Aeronautics at their Lewis Flight Propulsion Laboratory adjoining Cleveland's Hopkins Municipal Airport.

• **APPLICATION.**—The valve will be installed in the $32,850,000 wind tunnel testing ground for U. S. aeronautical scientists being instructed at the laboratory. The valve is one of two, the biggest of their kind ever built, designed by Salem-Brosius, Inc., in cooperation with N.A.C.A. engineers. Each valve is designed to withstand

(*Continued on page* 142)

sell DETROIT V·579 *the silent gas valve!*

UNIVERSALLY ADAPTABLE TO ALL TYPES OF GASES... ALL TYPES OF DOMESTIC GAS HEATING UNITS!

Silence can be golden in terms of profits when it comes to gas valves, too. That's because of the trend in modern residential construction to the single-story, basementless house which puts the heating-plant installation right next to living area. Here is where the Detroit V-579 Gas Valve really pays off. Its strong "Bi-flex" motor provides unfaltering opening and tight shut-off closing in absolute silence. Thousands of installations have proved its unsurpassed trouble-free performance. Simple in design, positive in operation, the V-579 operates independently of gas pressure and is available in sizes to fit any domestic heating system. Write today for Bulletin No. 229.

Check These Features

- **Silent operation—no click, no hum**
- **Rugged, compact—easy to service**
- **Inexpensive**
- **For all gases in all localities**
- **"Bi-flex" motor operated—low voltage**
- **Compensated for changes in ambient temperature**
- **Snap-acting opening and positive closing**
- **½-inch to 1¼-inch sizes**

DETROIT CONTROLS *Corporation*

5900 TRUMBULL • DETROIT 8, MICHIGAN, Division of AMERICAN RADIATOR & STANDARD SANITARY Corporation

Representatives in Principal Cities • Canadian Representatives in Montreal, Toronto, Winnipeg—Railway and Engineering Specialties, Ltd.

AUTOMATIC CONTROLS for REFRIGERATION

AIR CONDITIONING • DOMESTIC HEATING • AVIATION • TRANSPORTATION • HOME APPLIANCES • INDUSTRIAL USES

Serving home and industry

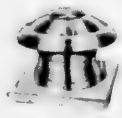
AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

Look for this name plate. It is your guarantee of protection on a Jenn-Air Exhauster motor
LUBRICATION . . . THIS MOTOR IS LUBRICATED FOR 10 YEARS OF NORMAL SERVICE
Set it . . . forget it for 10 YEARS

New Jenn-Air Low Contour Exhauster Motors are Lubricated for 10 Years of Service

Once a Jenn-Air Exhauster is set in a wall or on a roof, you can forget maintenance, because the motor is lubricated for 10 years of normal service. Since the bearing is the heart of any motor, you know this vital part is adequately protected in a Jenn-Air Exhauster. This is another feature by Jenn-Air, which has been FIRST with spun aluminum, rust-proof construction, no painting necessary; FIRST with simplicity of installation and ease of cleaning. Exclusive dual low-contour design means beauty that blends with today's modern architecture. It means fitting ventilation needs to the building which adds up to savings in labor and maintenance. Consult Jenn-Air Ventilating Specialists on ventilating problems.

Low contour Roof Exhausters blend with architectural design of building



Wall Exhausters —architecturally sculptured button design-spots ventilation control

JENN-AIR PRODUCTS COMPANY, INC.
Architects & Builders Building
Indianapolis 4, Indiana

Jenn-Air Products Company, Inc.
Architects & Builders Building, Indianapolis 4, Indiana
Please send me your free catalog 53B.

Name_____

Title_____ Company_____

Address_____

City_____ State_____

HV

GIANT VALVE

(*Continued from page* 140)

pressures up to 372,000 pounds across the face of a disc 15 feet in diameter. The valve will be used as a throttle valve to increase or decrease air flow in the wind tunnel system. It measures 8 x 19 x 20 ft, weighs 38 tons, and has a 15 ft diameter opening.

• **CONSTRUCTION.**—The valves were constructed to withstand terrific pressure and wind velocity without fluttering. No leakage of atmospheric air into the system through the valve could be tolerated, because such air would contaminate the dry, heated air used in actual tests. The valve is made of heavy, welded steel plate. A unique seal made of silicone rubber ⅜-inch thick around the inside periphery of the valve body was designed to prevent leakage of air. The seal is pressure inflated when the disc is in the closed position and must be deflated and held under a vacuum before the disc can be swung to the open position. Republic Rubber Co., worked with Salem-Brosius and N.A.C.A. engineers in developing the seal.

PLASTIC PIPE

gets attention of larger companies, including metal pipe makers who plan to research and promote it.

During the week ending September 4 in Gary, Ind., Naugatuck, Conn., and Louisville, Ky., completely unrelated developments took place that will have a profound effect on that vigorous youngster, the plastic pipe industry, according to a Business Week report.

• **COMPANIES.**—National Tube Div. of U. S. Steel Corp. was putting the finishing touches on facilities for producing a wide variety of plastic pipe at its Gary plant. It may be a full-scale move by a big-name competitor to capture a portion of the market now dominated by small plastic shops.

Naugatuck Chemical Div. of U. S. Rubber Co. was completing new facilities for production of Kralastic (a resin-rubber blend). This is the raw material now used in about 15% of all plastic pipe produced. With the new plant, Naugatuck will be able to triple its Kralastic output.

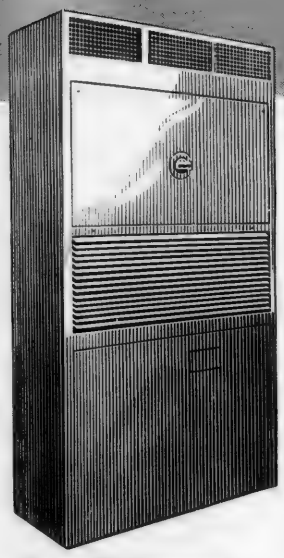
Tube Turns Plastics, Inc., has been established in Louisville by Tube Turns Div. of National Cylinder Gas Co. and Jackson & Church Co. to manufacture pipe fittings of unplasticized PVC (polyvinyl chloride) by a new patented process. PVC, long considered the dark horse in the plastic pipe race, has been handicapped by a shortage of suitable fittings.

• **GROWING UP.**—The moves by these well-known companies indicate the metamorphosis now taking place in the industry. The sizable capital investments involved are pretty convincing evidence that plastic pipe is fast approaching the "big business" category and the plastic materials suppliers seem convinced that it will stay there.

For an industry that was born after World War II, that is a tremendous feat. In 1947, Carlon Products Corp. of Cleveland first interested Pittsburgh Consolidation Coal Co. in plastic pipe made from polyethylene film

(*Continued on page* 145)

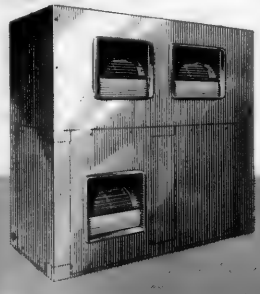
There's money in the air...
when you sell **CHRYSLER AIRTEMP!**



"Packaged" Water-Cooled Air Conditioners in 6 models, from 2 to 15 H. P.

Guaranteed by Good Housekeeping

"Packaged" Waterless Air Conditioners—no water needed, no plumbing required. 2, 3 and 5 H. P.



does the name help you sell?

THIS ONE WILL!

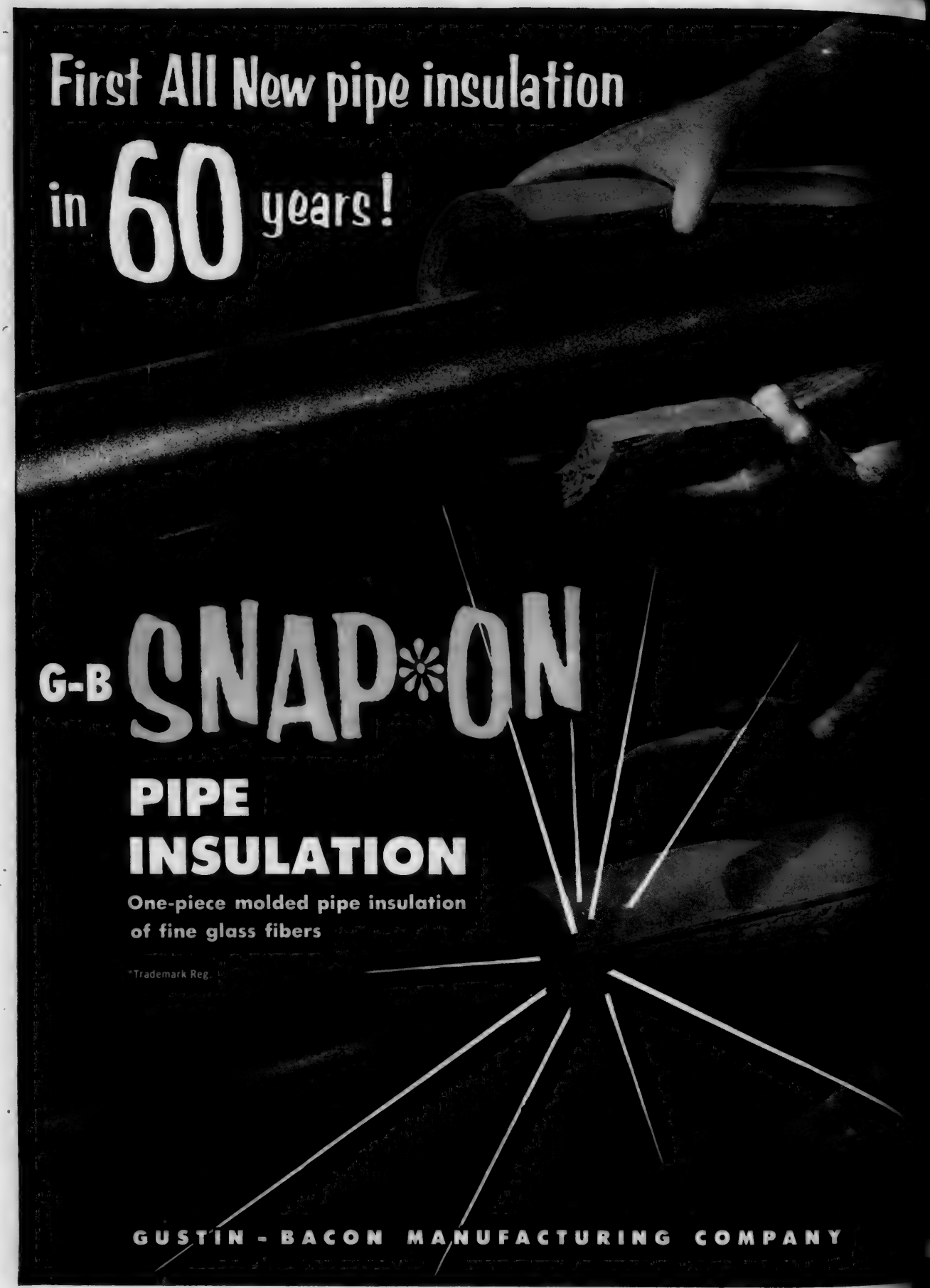
You will find that the great majority of your prospects—even those who have had no previous interest in air conditioning—know and respect the famous Chrysler Airtemp name. It's the name they associate with engineering leadership and products of only the highest quality. It's the name *you need* to make your job of selling "Packaged" air conditioning so much easier—and more profitable!

The pioneer name in "Packaged" air conditioning offers you many other important advantages, too, in the Franchise that really means business. Your inquiry is invited now. Write Airtemp Division, Chrysler Corporation, Dayton 1, Ohio.

AIRTEMP
DIVISION OF CHRYSLER

Air Conditioning's other name... *Chrysler Airtemp*

AIR CONDITIONING • HEATING FOR HOMES, BUSINESS AND INDUSTRY


First All New pipe insulation
in 60 years!
G-B SNAP*ON
PIPE
INSULATION
One-piece molded pipe insulation
of fine glass fibers
*Trademark Reg.
GUSTIN - BACON MANUFACTURING COMPANY

First All New pipe insulation in 60 years!

...ew G-B Snap*On Pipe Insulation is a one-piece ...olded pipe insulation of fine glass fibers for hot ... cold piping.

...UPERIOR THERMAL EFFICIENCY!

... factor is remarkably low—only .23 at 100 ... ... of this new material is the insulating ... of many 1" pipe insulations!

...NUSUAL PHYSICAL PROPERTIES!

... Snap*On is 4 to 10 times lighter than other ... insulations. It is virtually immune to damage ... won't break or crumble when dry, won't get ... or muddy when wet. It will not shrink, rot ... or decay.

...SNAP TO APPLY!

...-B Snap*On is flexible and resilient—snaps quickly ... round piping. The single seam is closed with staples, ... or bands. One man can easily handle light ... weight 6' sections. No dust, no coarse irritating fibers. ...-B Snap*On cuts easily with any knife. It can be ... "as is", covered with canvas, painted or finished ... desired. It is available with factory-applied vapor ... barrier facing for cold piping.

...OW IN COST!

... Snap*On Pipe Insulation, as a material, costs ... more than conventional insulations for any given ... Its unusual characteristics make it fast, cheap ... to install, handle and apply; users report application ... costs as up to 50% less!

...AILABLE IN SIZES ¾" TO 24"!

... Snap*On comes in one-piece sections in a com... range of pipe sizes from ¾" to 24" and in wall ... ... down to ½".

See Sweet's File (Architectural)
or Write for Samples and Complete Information

GUSTIN-BACON MANUFACTURING CO.
222 W. 10th St., Kansas City, Mo.

... • Chicago • Philadelphia • San Francisco • Los Angeles ... • Tulsa • Dallas • Detroit • St. Louis

PLASTIC PIPE

(*Continued from page* 142)

scrap. The capture of the coal mines was an important milestone for plastic pipe, but it never represented a large market. Steel pipe corroded and was left in place when mining operations moved to a new face, so there was a steady replacement market. But polethylene pipe was rolled up and used over and over again. While long life was a fine selling point, there was no replacement market to use it on.

As late as 1950, according to the Society of the Plastics Industry, only about 5 million lb of plastics went into pipe. This year 30 million lb will be used. Sales will top $25 million.

• **NEW ENTRIES.**—Aside from the obvious growth of markets in the past four years, the base on which the industry is built has been broadened considerably. As late as 1952, perhaps 95% of the plastic pipe produced was made of polyethylene. Now the other plastics are claiming a larger share, and markets are being developed in which their special properties can be used. A major materials supplier ran an intensive survey this summer, found that the materials being used were as follows: polyethylene (Bakelite and du Pont), 60%; Kralastic (U. S. Rubber), 15%; Tenite Butyrate (Eastman Chemical), 15%; miscellaneous, 10% (includes PVC, reinforced, fluorocarbon).

• **MORE COMPETITION.**—Carlon, whose sales of $6 million represent about a quarter of the industry total, is much more diversified than the average. Polyethylene represents only about 40% of its total business. Carlon is doubtful that polyethylene's share will drop much below the 40% level because of price. There are many new suppliers coming into the field (Monsanto, Allied Chemical, Texas Eastman, National Petro-Chemicals, Spencer Chemical, Dow Chemical). The greatly increased supply plus the competition will probably bring down the price. Some fabricators think that in a year or two polyethylene will be about the cheapest thing you can make a pipe out of.

• **EXPANDING MARKETS.**—Polyethylene's mass markets have been the farm and the home—for gas and water service. Kralastic has gone after special corrosion markets in paper mills, sewage disposal plants, water-treating plants, and food-handling plants. Tenite's biggest markets have been in the oil and gas fields. Resistoflex Corp. has worked with aircraft hoses made of high-temperature fluorocarbon plastic. But at least two contenders in the race are moving up fast.

PVC is good for a lot of corrosive-resistant jobs, but it has been held back by difficulties in processing. New methods of pre-plasticizing the material seem to solve one problem, and availability of fittings from Tube Turns another.

Reinforced plastic pipe is eying some of the higher-strength applications. If fabricating techniques can be worked out at a reasonable cost, it could provide real competition for metal. As it is now, plastic pipe is a competitor only in marginal markets, where pressure is not great or where corrosion is a major headache. At

(*Continued on page* 146)

separate draft fan

An exclusive Olson feature, not to be found on ordinary heaters, is the separate induced draft fan. It operates independently from the main fan motor and is activated by separate thermostatic controls. When the thermostat calls for heat, the draft fan starts.—Only when the temperature in bonnet reaches a predetermined point, the main blowing fans start, thereby delivering warm air immediately, avoiding cold blasts with every start. This feature is especially appreciated by people working in the area.

A bonus economy is gained when burner and draft fan stop. The main fans continue to operate, distributing all radiating heat until it is dissipated.

Write for Bulletin A1A — Detailed, Illustrated.

Olson

ARTHUR A. OLSON & CO.
CANFIELD, OHIO

Representatives in Principal Cities

HEATERS FOR GAS, OIL, COAL, OR DUAL GAS AND OIL

PLASTIC PIPE

(*Continued from page* 145)

present, metal pipe makers aren't tearing their hair over plastics competition—but then neither were the silk boys when rayon was six years old.

• **POTENTIAL.**—Another major trend in the plastic pipe industry—perhaps a carryover from the plastics industry in general—is the entry into the field by big name fabricators. The materials suppliers have always been big, but the fabricators have been small. Most people outside the industry have never heard of the leading makers of plastic pipe (such as Anesite Co., Johnson Plastic Corp., Plastex Pipe & Extrusion Co., Skyline Industries, Yardley Plastics Co.). In all, there are more than 50 companies now in business, and it's hard to determine relative standings.

The big news, however, is that larger companies with money for research and promotion are becoming involved. Continental Can Co., Inc., probably ranks high in the industry's top 10, with the purchase of Mills Plastic Pipe. Minnesota Mining & Mfg. Co. is a potential contender in the reinforced field, along with Youngstown Sheet & Tube Co. Republic Steel Co. has been in the plastic pipe business for some time, and now U. S. Steel is joining. Some observers feel that the entry of these big companies into the field may be partly for insurance, but many feel that their moves are based entirely on a tremendous potential market for plastic pipe.

STEAM BOILERS

come under scrutiny in three papers presented at fall meeting of engineering society

Three papers presented at the fall meeting of the American Society of Mechanical Engineers were concerned with problems in the utilization of steam. One paper discussed overspeed problems created by the accelerating potential of steam bottled up in the reheat circuit of reheat turbines; another the advantages of shop-assembled steam-generating plants in varied types of installations, and the third covered the results of intensive studies on forced convection boiling and pressure drop, as part of a research project to determine heat transfer rates through a bank of water tubes at high Reynolds numbers.

• **OVERSPEED PROBLEMS.**—This paper covered the various aspects of the overspeed problems inherent in reheat turbines because of the large quantities of steam bottled up in the reheat system. The relative merits of different protective devices or controls were considered and evaluated. A planned program for maintaining and checking the good operational conditions of these controls was discussed.

• **SHOP-ASSEMBLED BOILER.**—The design, testing and development of a shop-assembled oil- and gas-fired boiler and its coordination with burners and controls for full automatic operation is covered in a second paper. Arrangement of flame failure and safety interlocks were discussed as well as operating experience with heavy oils. Units range from 5,000 to 35,000 lb steam per hour at 250 psi and are easy to install.

(*Continued on page* 148)

PALMER

presents

an outstanding improvement in

DIAL THERMOMETERS

external calibration

Full 3½" Dial Face

- No Sector
- No Pinion
- No Linkage
- Constant Accuracy
- Easy Readability

WRITE FOR BULLETIN 350

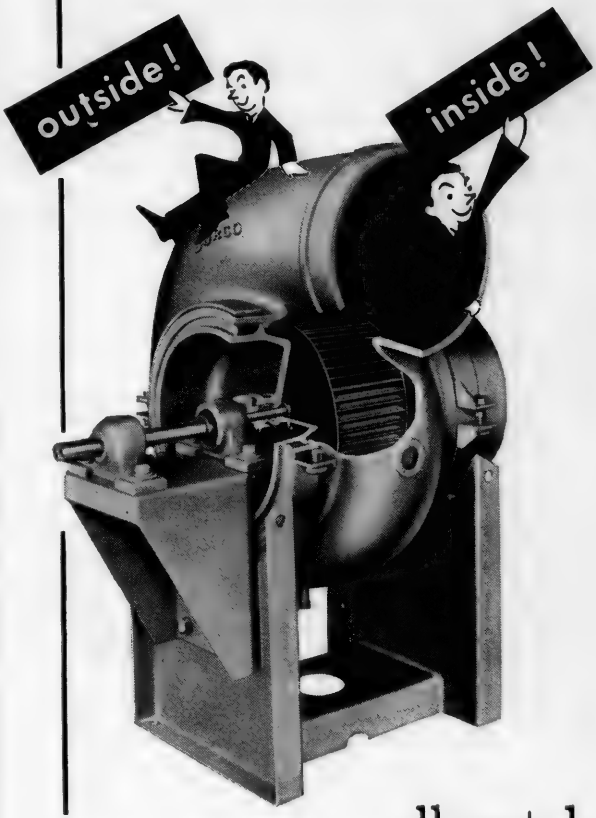
PALMER

THERMOMETERS, INC.

Norwood Ave. Cincinnati 12, Ohio

Mfrs. of Industrial Laboratory Recording and Dial Thermometers

corrosion-proof



because they're all metal

DURCO CORROSION RESISTING ALLOYS & EQUIPMENT **exhaust fans**

Duriron casing with Durimet 20 multi-blade rotor provide the corrosion resistance users have a right to expect when they specify fans to handle acid fumes.

New Durco fans are not only completely acid proof, but they've been completely redesigned for reduced weight and cost.

Install Durco exhaust fans for permanent service in industrial plants, schools, laboratories and hospitals.

Mail the coupon for details!

The Duriron Company, Inc.
Dept. HV, Dayton, Ohio

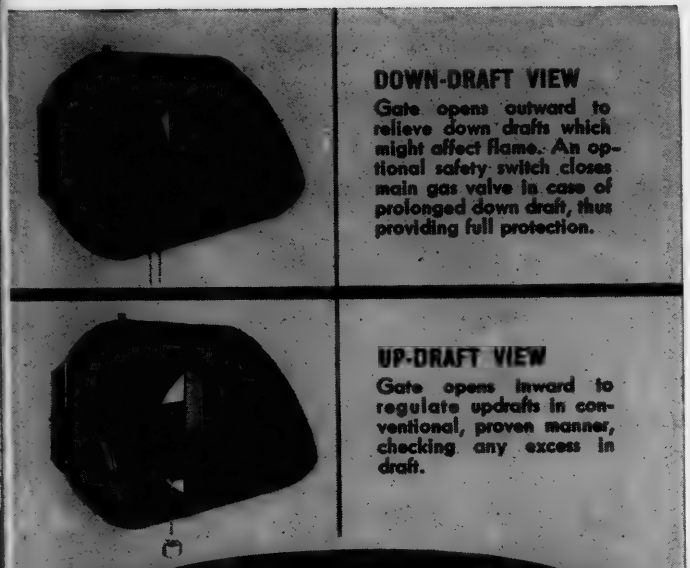
Please send Bulletin on Durco Fans.

Name_____

Company_____

Address_____

City_____ State_____


DOWN-DRAFT VIEW
Gate opens outward to relieve down drafts which might affect flame. An optional safety switch closes main gas valve in case of prolonged down draft, thus providing full protection.
UP-DRAFT VIEW
Gate opens inward to regulate updrafts in conventional, proven manner, checking any excess in draft.
field
"MG" Draft Controls
ENGINEERED SPECIFICALLY FOR
GAS
fired industrial and commercial plants
1. Double acting gate opens inward to regulate up-drafts and outward to relieve down-drafts.
2. Adding or taking off weights provides simple adjustment for up-draft conditions at time of installation.
3. Control will relieve internal or down-draft pressures of only a few thousandths of an inch.
4. Weights attached to gate itself are factory set to insure extreme sensitivity to down-draft conditions.
5. Corrosion resistant knife edge bearings resting on self-aligning bearing plates assure extreme sensitivity yet long life.
6. Side wings improve the regulation, making the control accurate at all gate positions.
7. Long collar keeps gate out of the path of flue gases — resulting in greatly increased life.
The Field "MG" has met the most rigid municipal requirements for commercial and industrial installations. It is being used with full approval of the nation's leading gas companies in the nation's largest cities. Fully safe, fully proven, it provides for gas-fired installations the same accurate, dependable performance, the fuel economy so long provided by Field Draft Controls for oil and coal fired furnaces. Write for complete information.
FIELD CONTROL DIVISION
of H. D. Conkey & Company — Mendota, Illinois
AFFILIATES: Conco Building Products, Inc. — Brick, Tile, Stone
Conco Materials Handling Division — Cranes, Hoists

STEAM BOILERS

(*Continued from page* 146)

• **HEAT TRANSFER STUDY.**—Results of an extensive experimental study of heat transfer were contained in a third paper, revealing that many heat transfer data have been obtained for crossflow of water through a staggered tube bank under conditions of forced convection boiling. The effects of pressure, heat flux, and flow rate on the inception of nucleate boiling were determined. The effects of these variables on the heat transfer rate under boiling conditions and in the transition stage between non-boiling and full surface boiling were also studied. In addition, the variation of the local coefficient around the circumference of a tube, under both non-boiling and boiling conditions was determined. In going from non-boiling to boiling conditions, considerable increase in the average coefficient was observed, with the greatest increase occurring in the vicinity of 70 to 80 deg F from the forward stagnation point. The heat-transfer data were taken at Reynolds numbers in the 10^5 to 10^6 range. Pressure drop results also were obtained, and they were found to be consistent with previously published experimental data obtained at lower Reynolds numbers.

CORROSION CONTROL

to be examined by engineers at nationwide association meetings scheduled for the next several months.

The National Association of Corrosion Engineers has announced the scheduling of a number of events to take place late this year and early next year, when technical papers will be presented and specializing committee meetings will be held in various parts of the country.

• **CHICAGO.**—Eleven symposia will be held during the Eleventh Annual Conference and Exhibition of NACE at Chicago, March 7-11, 1955. Also scheduled are a panel discussion on pipelines, a pipeline problem clinic, an underground corrosion round table, a general corrosion round table, three educational lectures, and numerous technical committee meetings.

• **LOS ANGELES.**—Corrosion problems of the West Coast will be given special attention at the Fourth Annual Western Regional Conference of NACE to be held at Los Angeles November 18-19. Topics scheduled include manufacture of pipe coatings, coal tar enamel protective coatings, concrete-mortar coatings, and mastic coatings and their properties.

• **DALLAS.**—Seventeen technical committees of NACE have scheduled meetings during the October 12-15 South Central Region Conference at Dallas. So many committees indicated intentions to meet that it was necessary to start the conference a day sooner than had been contemplated originally. Among those planning to meet are committees on pipeline corrosion, corrosion of cooling waters, pipe wrapping materials, identification of corrosion products, and plastic materials of construction.

• **BUFFALO.**—A two-day symposium on corrosion of underground structures will be presented October 27-28 at the Medical-Dental Building, University of Buffalo Campus, Buffalo.

(*More news on page* 157)

HEATING AND VENTILATING'S

Ad-Digest SERVICE

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

NOTE: While every attempt is made to list all advertisements, those which are received after the published closing date may not appear. The Index of Advertisers lists all the advertisements in this issue.

AMMONIA COMPRESSOR. Page 50. High operating efficiency and lighter weight make this modern unit the talk of the industry. It has the same high operating efficiency and versatility as its lower speed counterparts. Ranging in capacities from 18 to 150 tons, the new units can be used as high-stage or booster machines. Information available.....Item 201

AIR FILTER GAGES. Page 165. A dirt-clogged filter in air circulating or air conditioning systems lowers efficiency and costs money. This air filter gage, which is easy to read, and has minimum maintenance, measures the resistance that air meets in passing through the filter and calls your attention to a filter that needs attention. Bulletin available. .....Item 202

TANK GAGES. Page 164. Remote reading tank gages feature trouble-free design, without pulleys, springs or other mechanical gadgets, constant accuracy with large vertical scale with interchangeable scales readily removed or adjusted to correct for tank pitch. Gages can be installed easily on tanks above or below ground and up to ¼ mile away. Bulletin available. .....Item 203

UNDERGROUND PIPE INSULATION. Page 25. A triple-zone insulation for lifetime protection of hot underground pipes. The first zone is a dense semi-plastic core of the insulant which is fused on by the pipe's own heat; zone 2 is a sintered zone of the insulating particles, while zone 3 is unfused insulation providing a final margin of thermal insulation with a high load carrying capacity. Descriptive literature available. .....Item 204

UNIT HEATERS. Page 52. Whatever your unit heating needs, you can depend on these unit heaters for maximum heating comfort at lowest possible fuel cost. For over 25 years, this company's name has been synonymous with quality and advanced engineering. Information available. .....Item 205

PACKAGED BOILERS. Page 40. Every steam generator in this line is thoroughly tested before shipment. Completely assembled at the factory with burner and all boiler trim installed, it is set on a testing line, connected to service supplies, and fired. During this test period technicians check on all points of performance. Available in 18 sizes from 20 to 600 boiler hp. Catalog available.....Item 206

ROOF VENTILATORS. Page 166. Power roof ventilators with functional beauty combined with maximum operating efficiency and designed for schools, hospitals, libraries, churches and commercial buildings. Available in 31 sizes, 250 to 17,600 cfm. Information available.....Item 207

OIL AND GAS BURNERS. Page 166. Low installation and maintenance costs with added years of dependable service are features of this line of gas and oil burners. .....Item 208

FANS AND BLOWERS. Page 53. Out of this company's punishment pit come better fans for the customers. To be sure that the rotors can stand far greater strength than they would in an installation, the company tries to destroy them in its vacuum test pit where the rotors are revolved at tip speeds as high as 80,000 feet per minute. The slightest structural weakness shows up here in the pit, not in the installed fan.....Item 209

INDUSTRIAL BOILERS. Page 70. These standard boilers set industry standards. Whatever your steam needs, in this company's line of fuel burning and steam generating equipment, you will find a type and size just right for you. Information available.....Item 210

OIL HEATERS. Page 154. Features of these heaters are simplicity of installation, low-cost operation, and maximum comfort. Available in ten sizes from 112,000 to 220,000 Btu per hr to meet all situations. Fits all budgets and all needs. Information available.....Item 211

HEATERS. Page 146. An exclusive feature, not to be found on ordinary heaters, is the separate induced draft fan. It operates independently from the main fan motor and is activated by separate thermostatic controls. Bulletin available. .....Item 212

AIR DIFFUSERS. Page 157. You can give free rein to your creative planning and still rely on this company's square and rectangular diffusers to provide draftless air distribution from any location. These diffusers need not be centrally located in an area if such placing does not agree with the decortive motif, or if a beam or other obstruction is in the way. Information available. .....Item 213

TEMPERATURE CONTROL SYSTEM. Pages 16, 17. This pneumatic system of temperature control provides comfortable, even heat at the right temperature at the Ford auto-assembly plant at Wayne, Mich. This system improves efficiency of employees and results in increased production, better products, and lower heating costs. Information available. .....Item 214

AIR DISTRIBUTION. Page 139. Nearing completion at Westville, Ind., is one of the world's largest institutions for the mentally ill. Air distribution in most of the project has been engineered with this company's equipment including sidewall and ceiling-type diffusers to assure comfort conditions for the patients and staff members. Over 2,500 pieces of this company's air distribution equipment have been specified or installed in the various buildings. Information available. .....Item 215

CONTROL SYSTEMS. Pages 10, 11. This company offers a complete range of outdoor reset control systems available for any building, residence to skyscraper. It is possible to maintain a continuous even flow of heat regardless of weather changes. Literature available. .....Item 216

STEEL PIPE. Page 58. A most efficient and dependable pipe and tubing were chosen for Television City, CBS west coast studios. For over 60 years this pipe has been accepted standard for conventional hot water and steam heating systems, fire control and plumbing lines. Ideal also for modern radiant heating and snow melting installations. Uniform, dependable performance. .....Item 217

STEAM TRAPS. Page 160. When the valve and valve seat of this dual steam trap become worn, neither these parts nor the trap itself need be replaced. Merely reverse valve and seat by a simple operation and you double the life of the trap. All working parts are mounted on the cover. Information available. .....Item 218

PUMPS. Page 46. This company's pumps have been the quality choice of leading architects, engineers, and contractors for more than 40 years. The reputation of these pumps for efficiency and dependability has earned them a place in many of today's outstanding buildings, for circulating, heating, bilge and sewage pumping. Information available. .....Item 219

COOLING TOWERS. Page 137. A 20-year guarantee on the wetted-deck surface of these residential cooling towers is offered by the manufacturer. These towers recirculate precious water, meet requirements of municipalities which prohibit wasting cooling water to sewers, and are low in cost. Bulletin available. .....Item 220

PLEASE SEND US MORE INFORMATION

Circle below item numbers on which you wish further information.

201	202	203	204	205	206	207	208	209	210	211	212	213	214
215	216	217	218	219	220	221	222	223	224	225	226	227	228
229	230	231	232	233	234	235	236	237	238	239	240	241	242
243	244	245	246	247	248	249	250	251	252	253	254	255	256
257	258	259	260	261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280	281	282	283	284
285	286	287	288	289	290	291	292	293	294	295	296	297	298

PLEASE PRINT Oct. AD-54

This service available only to U. S. and Canadian readers

Name..... **Title**.....

Firm .....

Nature of Firm's Business.....

Street .....

City..... **Zone**..... **State**.....

This card is void after Jan. 1, 1955

Circle numbers corresponding to the advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

Ad-Digest SERVICE

GAS VALVE. Page 141. This silent gas valve is universally adaptable to all types of gases, and all types of domestic gas heating units. Its strong motor provides unfaltering opening and tight shut-off closing in absolute silence. Thousands of installations have proved its unsurpassed trouble free performance. Bulletin available. ----------Item 221

TURBINE VENTILATORS. Page 162. Accurately rated, these wind-driven turbine ventilators are doing a noteworthy air displacing job on commercial and industrial roof tops all over the country. Ruggedly built of prime sheets of heavy-gage coated iron, these noiseless ventilators are in stock ready for immediate delivery. Catalog available. ----------Item 222

MOTOR CONTROL. Page 71. These automatic starters are so popular for refrigeration and air conditioning service because they are trouble-free. Only one moving part and no pivots, pins, or bearings to corrode or stick. There are no jumpers to break. Bulletin available. ----------Item 223

CENTRIFUGAL PUMP. Page 165. This pump was designed specifically to render long service under difficult dust conditions. In addition to a rotary type mechanical shaft seal, there is a reversible ceramic floating seat and carbon washer combination held by a stainless steel spring. This insures long life and leakproof operation. Bulletin available. ----------Item 224

UNIT HEATERS. Page 153. Not only are these unit heaters for steam and hot water designed for out of the way installation, but compactness enables them to take up little space anywhere. Efficiency, styling, controls, and dependability reflect this company's high class engineering. Information available. ----------Item 225

ELECTRIC MOTORS. Page 35. The two extra bolts in the end housing of every motor built by this company are the proof of extra protection against bearing failure. These are the bolts that hold the bearing cap tightly in place against the inner face of the bearing enclosure. This results in motors that pay off in longer trouble-free bearing life and lower motor maintenance. Information available. ----------Item 226

DAMPER EQUIPMENT. Page 63. This ad features the company's damper set for multi-blade dampers which provides perfect damper control in heating, ventilating and air conditioning blower exhaust systems, their silent duct, a flexible connection, and their vane runners for making turning vanes in square elbows. Information available. ----------Item 227

PRECIPITATOR. Page 42. Dust, soot and even smoke are easy pickings for this high efficiency precipitator. With the addition of the company's Type H washer, the complete cleaning operation is done automatically with the mere push of a button. A high efficiency precipitator with a dependable, always available maintenance crew built in. Information available. ...Item 228

BOILER TUBES. Page 69. For three-quarters of a century, this company has been directly concerned with developing and applying boiler tubes for all pressures up to those approaching 3,000 psi. The application of this extensive knowledge and experience results in the production of finer welded boiler tubes. If you want ease of fabrication and long service life for the tubing in your boiler, choose this company's boiler tubes. Information available. ----------Item 229

BRASS VALVES. Page 22. Save time, trouble, and money by standardizing on these quality 150-pound valves. They are simple to service, and no big inventory of replacement parts is necessary. Just a few extra disc holders, and a supply of composition discs are needed. That's all you need for a wide variety of fluids and an economical maintenance program. Folder available. ----------Item 230

EXHAUST FANS. Page 147. The company's casing with the 20 multi-blade rotor provide the corrosion resistance users have a right to expect when they specify fans to handle acid fumes. These fans are not only completely acid-proof, but they've been completely redesigned for reduced cost and weight. Bulletin available. ---Item 231

STEAM GENERATOR. Page 47. This steam generator is a complete unit, factory tested, factory certified, conservatively rated, using any fuel or gas, or combination, equipped with modern safety features. The wide range of applications enjoyed by this steam generator reflects the company's know-how of more than 90 years in building boilers to meet every trend in design. Bulletin available. Item 232

40TH ANNIVERSARY. Pages 36, 37. This company's first product went into service just 40 years ago. During 40 years manufacturers have found that this company's advanced design and quality construction improved the sales value and performance of their products. Contractors and service men know that this company's products work with them to satisfy the customer. That is the way it has been for 40 years, that is the way it will be in the years ahead. Information available. ----Item 233

AIR DIFFUSERS. Page 156. This company's square and rectangular air diffusers are custom-made to suit conditions of each application. The patented, built-in diffusing vanes are scientifically arranged in various louver patterns which provide blows in 1, 2, 3, or 4 directions without use of blank-offs. Catalog available...Item 234

AIR CONDITIONING EQUIPMENT. Page 56. This ad shows how these air conditioning units were chosen exclusively for the important year-round comfort-conditioning job at the new main office of James Vernor Co. in Detroit. This company manufactures a complete line of air conditioning equipment. Information available. ----------Item 235

VIBRATION CONTROL. Page 162. This company's vibration isolators allow heavy upper floor air conditioning equipment installation without floor reinforcement and with positive assurance of vibration and noise control. Bulletin available. ----------Item 236

COPPER TUBING. Page 55. You can make big savings on installation costs when you use this company's copper tubes. Operating costs are less too. The smooth, rust-free interior surface means lower pumping costs. Information available. ----Item 237

WATER LEVEL CONTROLS. Page 37. There is always something new in steam heat. And as long as there are developments in boilers and heating systems, there will be dependable water level controls by this company for any type or size, just as there are now. Line includes feeder cut-off combination for boilers, low water cut-off, and water level control devices. Information available. ----------Item 238

MOTOR BEARING LUBRICATION. Page 159. This company offers a full color profusely illustrated booklet of facts that have a bearing on the life of your motors. The booklet illustrates the three principal types of bearings used in motors, explains the functions of each, and demonstrates with natural color photos the manner of lubrication. Booklet available. ---Item 239

WATER CHILLERS. Page 67. These water chillers come factory assembled with circuits completely piped, wired, and tested, and can be installed in a half hour. Just make a few simple electrical and plumbing connections and the chiller is installed. Literature available. ----------Item 240

UNIT HEATERS. Page 161. Day after day, year after year, you can depend on these blower type unit heaters with their diversified applications. Units in ceiling type with filter and damper sections. Bulletin available. ----------Item 241

INDUSTRIAL HEATING. Pages 20, 21. With one of this company's units you can produce as much heat as several propeller type heaters plus ventilation. The units can be hung from wall or girders, mounted on ceilings, or set in the floor. Information available. ----------Item 242

COPPER TUBING. Page 51. This company considers it highly significant that America's leading distributors have chosen their copper tube to sell and recommend. This company's streamlined, shirt sleeve service eliminates delays, speeds delivery from factory to distributor and contractor. Information available. ----------Item 243

COPPER TUBING. Page 44. This copper tubing for soil is easy to install. It comes in 20 foot lengths which means fewer joints for soil, waste and vent lines. You will save time in installation and in final pressure testing. Information available. ----------Item 244

BOILER WATER FEEDERS. Page 155. This boiler water feeder for low pressure space heating steam boilers have established their unquestionable leadership in today's design of boiler water feeders. These are the most advanced feeders available on the market today. Information available. ----------Item 245

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U.S.

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

HEATING AND VENTILATING
148 LAFAYETTE STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

CONVECTOR. Page 164. An unmatched combination of beauty, long life, and uniform healthful heating with this line of convector radiation. Bulletin available. ----------Item 246

STEEL BOILERS. Page 128. This ad shows another of the nation's largest housing projects heated by this company's steel boilers. The modern and immense Capt. Wendell Oliver Pruitt Homes, St. Louis, Mo., will be heated by 12 of these steel boilers. It's another case of the best in steel boiler heat for the big jobs. Information available. ----------Item 247

AIR HANDLING. Page 48. All air in the new Wyandotte Research Laboratories is cleaned, conditioned, humidified and then distributed by this company's fans. This air handling equipment was specified for its dependability and quiet operation. Information available. ----------Item 248

PIPE INSULATION. Page 65. This modern monolithic insulation for underground heated piping is installed after the pipes. Its structural concrete base pad provides better working conditions and pipes can be welded on or below grade, and placed with no special care or handling. Booklet available. ----------Item 249

RADIATOR TRAP. Page 2. Installations of this radiator trap customarily give from 15 to 30 years of satisfactory service at just pennies a year for maintenance. These traps save fuel, prevent steam loss, and hold steam within the radiators or steam using equipment until it has given up all its useful heat. Information available. ----------Item 250

CENTRAL STATION COOLING. Page 54. This rugged, compact central plant air conditioning unit supplies air, conditioned for simultaneous unequal heat load demands in various zones requiring individual temperature and humidity control. Units are of the blow-through type with divided outlets to serve multiple zones. Information available. ----------Item 251

STUD FASTENER. Page 160. The high speed and wide utility of this fastener have made it the 2 to 1 favorite over all other powder-actuated fastening methods. More contractors use this fastener than all other makes combined. Information available. ----------Item 252

STEEL PIPE. Page 75. The 7 points of uniform goodness in this steel pipe are uniform ductility, length, threading, weldability, wall thickness and size, strength and toughness, and roundness and straightness. Information available.----------Item 253

DUCT LINER. Page 66. This glass fiber duct liner is soft, pliable, pleasant to handle and as simple as ABC to install. This duct liner is also a wonderfully efficient acoustical and thermal insulation. Technical bulletin available.----------Item 254

HEAT EXCHANGERS. Page 163. These heat exchangers are three ways better. They are designed for maximum operating efficiency and rapid heat transfer, built for optimum performance and life, and engineered to suit your requirements. Catalog available. ----------Item 255

AUTOMATIC CONTROL. Back cover. This ad shows how this company's temperature control system meets the exact needs of the individual control problem encountered in the plant of Tinnerman Products, Inc., thus insuring the desired results at the lowest possible operating cost. Information available. ----------Item 256

Circle numbers corresponding to the advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

FIRE PROTECTION EQUIPMENT. Page 164. This company's line of interior fire protection equipment includes 480 cabinets alone. This equipment is proved reliable, economical, easy to install and generally best for clients. Information available. ----------Item 257

YEAR ROUND AIR CONDITIONING. Page 153. The Constitution Building in Atlanta has installed this company's air conditioning throughout. The main cooling load is carried on a central station basis by four compressors: two of these are installed in a penthouse, and the others are on the fourth floor. In addition, this company's unit air conditioners of 5 and 7½ hp serve the retail store on the street level and the executive suite on the fourth floor. Information available. ----------Item 258

PUMPS. Page 39. Get the most from your pump investment. There is a wide range of types and capacities for every heating pump need. Let this company advise you on your next tough job. Bulletins available. ----------Item 259

EXHAUSTER MOTORS. Page 142. Once this company's exhauster is set in a wall or on a roof, you can forget maintenance because the motor is lubricated for ten years of normal service. Since the bearing is the heart of any motor, you know this vital part is adequately protected in this company's exhauster. Catalog available. ----------Item 260

UNIT HEATERS. Page 43. You get heat where you want it, when you want it, whatever the fuel you use with this company's unit heaters. This company's name is backed by over 60 years of heating experience. Regardless of the type of model you choose, you can depend on this company's unit heater to give balanced heating performance plus maximum fuel economy. Information available.----------Item 261

AIR DIFFUSERS. Pages 28, 29. This company's air diffusers are styled to harmonize with contemporary architectural concepts. In performance, the flexibility of the line permits engineers to select a type and size that will operate with top efficiency. Simplicity of design and rugged construction results in simplified installation. Catalog available.----------Item 262

WATER CIRCULATORS. Page 14. For real dependability and fine performance choose this company's water circulators. Time-tested design, improved efficiency, increased capacity with job-rated power for each size are features of this circulator. This company offers the greatest value per dollar in circulators today. Information available.----------Item 263

COOLING TOWER. Page 163. This company's cooling tower has more capacity because the redistributing decks keep the water uniformly suspended, providing maximum contact between air and water. Casing and sump are of heavy gage steel, hot dip galvanized after fabrication. Unit is shipped assembled but can be knocked down to eliminate rigging costs. 3 to 8 ton capacities.----------Item 264

Use this Digest to locate and refer to advertisements appearing in this issue of HEATING AND VENTILATING, then fill out and mail the prepaid postcard to request further information.

FAN UNITS. Page 30. The design of this company's fans is highly efficient, yielding to a maximum air volume-to-power ratio. Blades are of true airfoil shape, and are readily adjustable for maximum flexibility to meet varying conditions. Thick steel casings are used in the sturdy construction that smothers operating noise. Bulletin available.----------Item 265

FIN AND PIPE COILS. Page 160. Fin and pipe coils or stainless steel solved an acid vapor heating and cooling problem in industry. These coils are ideally suited for handling all types of corrosive air mixtures, gas or liquid for heating or cooling needs. Send details or blueprints for engineering advice.----------Item 266

BOILERS. Page 72. The secret of these boilers is in their circulating connection. Like miniature jet nozzles, they blast supercharged streams of steam and hot water across the heating tubes, sweeping and keep away heat insulating bubbles that would ordinarily cling to the tubes and slow down heat transfer. Information available.----------Item 267

PUMPS. Page 73. These pumps are designed specifically for forced hot water heating systems. They can be serviced without being removed from the line. More of these pumps are sold than any other pump built for the same purpose. Information available.----------Item 268

HEATING SPECIALTIES. Page 68. No job is small enough to gamble on. For your next installation, large or small, use the valves, traps, and vents that have earned the confidence of the most critical heating engineers and contractors. Catalog available.----------Item 269

BASEBOARD CONVECTOR. Page 23. This baseboard convector offers highly efficient hot water heating for every type of construction at low cost. It is the ultimate in modern heating design with many time and money saving features. Catalog available.----------Item 270

AIR FILTERS. Page 26. Because one filter won't do every air cleaning job, this company has 9 standard types designed to handle practically any dirt condition. The operating efficiency of the entire air handling system is dependent on the filters used. That is why it is so important that the right type filters be installed. Information available.----------Item 271

PLEASE SEND US MORE INFORMATION

Circle below item numbers on which you wish further information.

201	202	203	204	205	206	207	208	209	210	211	212	213	214
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285	286	287	288	289	290	291	292	293	294	295	296	297	298

PLEASE PRINT Oct. AD-54

This service available only to U. S. and Canadian readers

Name..... **Title**.....

Firm .....

Nature of Firm's Business.....

Street .....

City..... **Zone**..... **State**.....

This card is void after Jan. 1, 1955

Ad-Digest SERVICE

SEWAGE EJECTOR. Page 161. This screenless submersible sewage ejector with the bladeless impeller will pump all sewage and industrial waste, even rags. It is ideal for installation where flash floods caused by heavy rainfall create a heavy drainage load. Bulletin available.....Item 272

COMPRESSORS. Page 7. These compressors operate at speeds much slower than other compressors of the same capacities. They deliver full capacity refrigeration and air conditioning with less costly motion, less wear on working parts, less maintenance required, and lower operating costs. Information available..Item 273

STEAM TRAPS. Inside front cover. These traps save you money because of their many desirable features. Features include choice of body styles, two-phase leverage, built-in strainer, internal check valves, and hardened, ground and lapped valve and seat. Catalog available.....Item 274

HEAT TRANSFER EQUIPMENT. Page 166. This company's line of air conditioning and refrigeration equipment includes such items as evaporators, condensers, brine coolers, water chillers, receivers. Company carries special designs for process industries, and its engineers have been designing general heat exchange apparatus for almost a half a century. There is no substitute for experience. Information available.....Item 275

DRAFT CONTROLS. Page 148. This company's draft control has met the most rigid municipal requirements for commercial and industrial installations. It is being used with full approval of the nation's leading gas companies in the nation's largest cities. Information available..Item 276

COOLING TOWERS. Page 135. Today a cooling tower is a must in every air conditioning installation involving water-cooled condensing units. Homes are no exception. In many communities the use of water for this purpose is restricted. In others high water rates result in excessive operating costs. This company's residence cooling tower makes it possible to cool and recirculate the condensing water at a tremendous saving. Bulletins available.....Item 277

DIAL THERMOMETER. Page 147. An outstanding improvement in dial thermometers. Features include no sector, no pinion, no linkage, constant accuracy, and easy readibility. Bulletin available.....Item 278

HORIZONTAL FURNACES. Page 153. Cash in on the tremendous demand for horizontal-type furnaces. Increased production brings better delivery, and you can meet or beat all competition for practical, well-made, efficient furnaces. Information available.....Item 279

COPPER TUBING. Page 127. This copper tubing is preferred whether it be for vent lines, waste stack lines, radiant panel heating, air conditioning, hot and cold water lines, underground service lines, or processing lines. Information available.....Item 280

HEATING EQUIPMENT. Page 74. Contractors, dealers, servicemen, and customers are happy with this company's heating. It is profitable to install, easy to service, and economical to own. Information available.....Item 281

GENERATOR. Page 60. This company has been building boilers of quality for over 100 years. Back of every generator is this long, successful experience. Represented by the engineering staff, a large group of skilled boiler makers and an efficient, nation-wide sales and service organization is at your disposal. Information available.....Item 282

VENTILATORS. Page 159. This company's engineers, with more than half a century of practical experience in designing, manufacturing and recommending ventilators are without obligation at your service. Bulletin available.....Item 283

COOLING EQUIPMENT. Page 32. This company gives you everything you need to do practically any refrigerating or air conditioning job. This company's quality is your assurance that those jobs will be right, and that customers will be completely satisfied. Information available.....Item 284

WATER HEATERS. Page 133. This copper-lined heater is a complete copper heater built inside of a heavy steel shell. It combines non-corrosive properties of copper with the superior strength of steel. Catalog available.....Item 285

AIR DIFFUSERS. Page 59. These high pressure adjustable air diffusers assure quiet air delivery. An advantage of these diffusers is that the amount of air to a given area can be varied from within that area by a simple wall control. Information available.....Item 286

PIPE INSULATION. Pages 144, 145. A pipe insulation which is a one-piece molded pipe insulation of fine glass fibers for hot or cold piping. Advantages of this insulation are its superior thermal efficiency, unusual physical properties, ease of application, and low cost. This insulation comes in one-piece sections in a complete range of pipe sizes and wall thicknesses. Information available.....Item 287

MOISTURE CONTROL. Page 155. This air conditioning method dries air directly and measurably, using a moisture-absorbing liquid spray. It makes humidity control a separate function from lowering or raising temperatures and gives you precise control with thermostats alone. Bulletin available.....Item 288

INDUSTRIAL FANS. Inside back cover. These industrial fans are particularly well suited for diversified air and material handling applications. You'll profit from the high efficiency, in the field adaptability, and numerous other features of this exceptional fan equipment. Bulletin available.....Item 289

FANS. Page 1. These fans are available with fan wheels from 12 to 48 inches in diameter, with exhaust capacities up to 45,000 cfm. These fans install just like a flanged section of duct work, and are scarcely larger in diameter than the duct work. Catalog available.....Item 290

UNIT HEATERS. Page 9. These unit heaters can be mounted any way you want, floor, horizontal, wall or inverted. The discharge or intake can be face, top, or bottom and direct or with ducts. The casings have fronts that conceal the rough opening to save plastering headaches. Information available.....Item 291

BOILERS. Page 31. Top to bottom, inside and out, you get more money saving features when you specify or buy this company's self-contained boilers. You make an investment in quality that pays off in lowest net cost per pound of steam for processing or heating. Catalog available.....Item 292

AIR GAGE. Page 162. This gage determines the correct air volume by measuring the static pressure drop, in inches of water, across the air conditioning system's evaporator. Bulletin available.....Item 293

STEAM TRAPS. Page 57. This company offers a complete line of low, medium, and high pressure thermostatic traps with uniform guarantee of quality and precision workmanship. Catalog available. Item 294

COOLING TOWERS. Page 38. These towers lend themselves to economical screening by masonry or wood structure and in many cases, are completely concealed by normal parapet walls. While small in physical dimension, they pack highly concentrated cooling ability in every foot of plan area. Bulletin available.....Item 295

DEALER SERVICE. Page 45. This company has the finest dealer set-up in the business with a combination of factory cooperation, on the spot district managers, great engineering and local training schools. Information available.....Item 296

CEILING PANELS. Page 62. These new concealed ceiling panels cost less to install than ordinary air diffusers. This is possible because these panels are so extremely simple and easily positioned. They can be assembled and installed in seconds by hand without the use of tools. Literature available.....Item 297

DRAFT INDUCER. Page 34. This company's draft inducer's advanced design sets a new high standard for the industry. Features are easier installation, adaptability, and long trouble-free operation. Bulletin available.....Item 298

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FIRST CLASS PERMIT NO. 52, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

HEATING AND VENTILATING

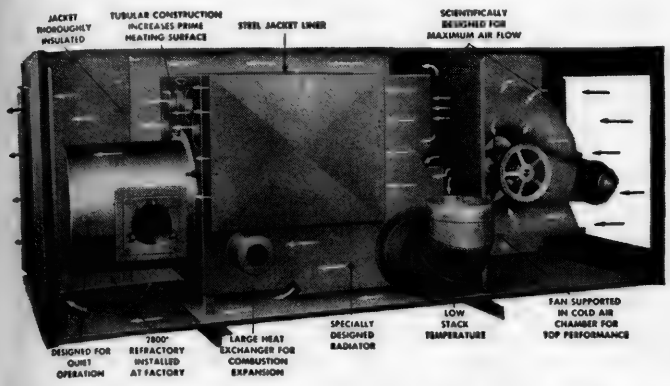
148 LAFAYETTE STREET

NEW YORK 13, N. Y.

AD-DIGEST SERVICE

Wondaire

... OUTSTANDING DESIGN FAMOUS FOR RAPID, AUTOMATIC HEATING!


JACKET THOROUGHLY INSULATED
TUBULAR CONSTRUCTION INCREASES PRIME HEATING SURFACE
STEEL JACKET LINER
SCIENTIFICALLY DESIGNED FOR MAXIMUM AIR FLOW
DESIGNED FOR QUIET OPERATION
"800" REFRACTORY INSTALLED AT FACTORY
LARGE HEAT EXCHANGER FOR COMBUSTION EXPANSION
SPECIALLY DESIGNED RADIATOR
LOW STACK TEMPERATURE
FAN SUPPORTED IN COLD AIR CHAMBER FOR TOP PERFORMANCE

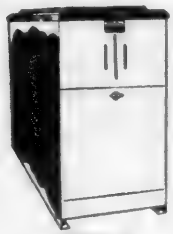
EASY-TO-SELL TROUBLE-FREE, OIL OR GAS FIRED HEAT

Cash in on the tremendous demand for horizontal-type furnaces—write for attractive dealer or jobber sales plans. Increased production brings better delivery—and you can meet or beat all competition for practical, well-made, efficient furnaces. Designed for garages, stores, service stations, warehouses, factories and dwellings.

COX MANUFACTURING COMPANY
RIDGEVILLE, INDIANA
EXCLUSIVE MANUFACTURERS OF WONDAIRE DESIGNED FURNACES

WORLD'S FINEST OIL OR GAS FURNACES

There is a WONDAIRE furnace for every heating need. If you are an alert, up-to-date jobber here is your opportunity to tie up with one of the finest manufacturers in the business. Sizes from the smallest to the largest are available including: 80,000; 95,000; 115,000; 150,000; 225,000; 300,000 and 400,000 BTU. Shipped completely assembled—all parts standard and nationally known.



MODEL R
115,000 to 212,000 BTU

MODEL H
80,000 to 150,000 BTU

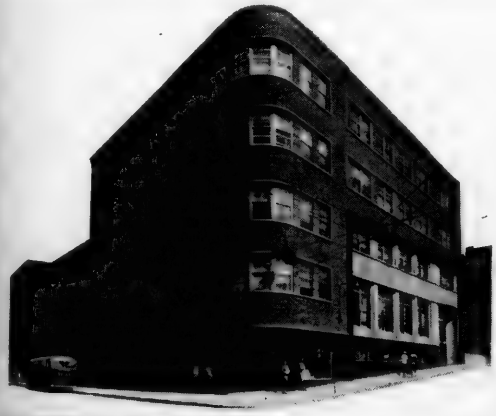
MODEL CFO
80,000 to 150,000 BTU

MAIL THIS COUPON NOW!

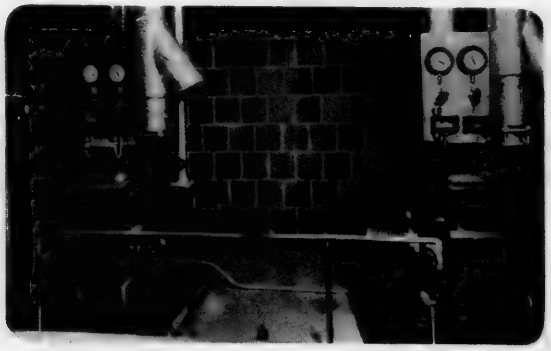
SEND ME COMPLETE INFORMATION ON—

☐ Horizontal ☐ Model R
☐ Model H ☐ Model CFO

Name .....
Address .....
City & State .....



Frick "ECLIPSE" Compressors, like these installed in the Constitution Bldg., have 2, 3, 4, 6 or 9 cylinders.



Constitution Building, Atlanta, Installs Air Conditioning Throughout

This modern building, occupied by the Georgia Power Co., now enjoys year 'round air conditioning.

The main cooling load is carried on a "central station" basis by four Frick "ECLIPSE" compressors: two of these are installed in a penthouse, and the others on the fourth floor.

In addition, Frick unit air conditioners of 5 and 7½ hp. serve the retail store on the street level, and the executive suite on the fourth floor. Operation of both types of systems is very satisfactory.

Whether you are an owner, architect, builder, heating contractor, or refrigeration distributor, we have air conditioning equipment and services of interest to you. Write for literature, estimates, or dealer contracts today; certain good territories still open.

This 5-hp. Frick unit air conditioner is equipped with duct work to condition the retail store of the Georgia Power Co.

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA. U.S.A.

PROBLEM:
"We need a new heating system, but can't afford an expensive one."

SOLUTION:
"We saved $6000 by installing Delta OIL-FIRED UNIT HEATERS in our plant!"

"We had neither the space nor the funds to install a complex boiler system . . . and the cost of gas in this area was too high for our budget. So we struggled along with inadequate heating . . . until Delta direct-fired Oil Unit Heaters solved our problem. They're doing a big job at an unbelievably low cost!"

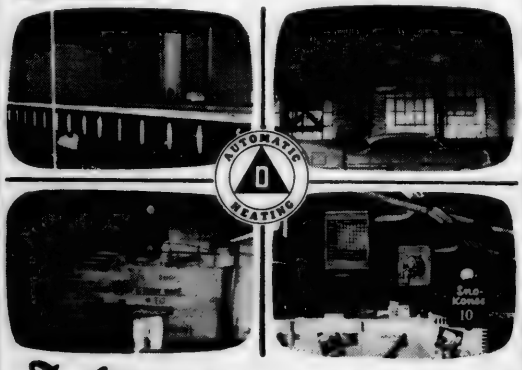
Delta
DIRECT-FIRED OIL UNIT HEATERS
fit everybody's budget, everybody's needs.

SIMPLEST TO INSTALL: Big savings on installation costs. They need no large chimney, boilers, pipes, fittings. Factory wired and assembled . . . just hang them up.

LOWEST COST OPERATION: Delta's powerful pressure oil burner does a most effective and efficient heating job on low cost #2 fuel oil. Maintenance is simple and seldom. Costs 50% less to operate than old-style systems.

GREATEST COMFORT: Within seconds the Delta Unit Heater bathes the entire working zone with comfortable, even heat . . . with no cold spots, no overheating. Ten sizes from 112,000 to 220,000 BTU/hr. to meet all situations.

On your next installation, let DELTA OIL UNIT HEATERS solve all your price and performance problems. Write today for information.



Delta HEATING CORPORATION
10 COLE STREET • TRENTON 8, N. J.

What Would You Do?

(*Concluded from page* 114)

to assembly and then assembled in a space in which desired percentages of relative humidity and temperature are maintained. For coil and transformer winding recommended conditions are 72F dry bulb and 15 to 25 per cent relative humidity. Electronic tube assembly requires approximately 68 to 70F at approximately 40 per cent RH. The assembly of component parts into an electronic device should be done at approximately 72 to 74F at 50 per cent RH. Other parts construction requirements may be estimated using the above as a basis after determining the amount of allowable moisture in the finished part. Coils should be wound and dip-sealed, or impregnated against moisture, in a specially treated space and may then be removed to assembly areas without fear of moisture gain.

Thermo-equivalent conditions to be maintained in an area where people, requiring one set of conditions, are working with materials requiring different conditions, must sometimes be a compromise between the requirements for human comfort and the manufacturing process. Where compromise is impossible because of rigid product requirements, the only solution to the problem of human comfort is to have personnel wear clothing suitable for the manufactured weather, or change to automatic machinery. Temperature and relative humidity for human comfort depends to a great extent upon the degree of activity required of personnel in the performance of their duties. Where 70F and 50 per cent RH may be quite comfortable to an active person, it may become uncomfortable to an inactive one. The metabolic rate of the human body tends to warm up active parts of the body yet maintain fairly constant temperatures in other less active parts. For example, at 70F and 50 per cent RH a stenographer may complain of having cold feet while being perfectly comfortable in the upper portion of the body. The arms and shoulder muscles are active; feet are inactive. Much of this complaint is purely psychological, yet it presents an annoying problem where constant conditions of low temperature and RH are necessary.

Some types of bacteria are destroyed in a relative humidity of 50 per cent, but *all* bacteria cannot be destroyed in untreated air regardless of the per cent of relative humidity. The closest approach to complete freedom of bacteria in recirculated air may be accomplished by the inclusion of an electronic air cleaner, to remove bacteria laden dirt, dust and other microscopic matter, and the use of glycol vapor in recommended quantities.

Walter R. Yeary
Engineer, Air Conditioning Division,
Westinghouse Electric Corp.
Staunton, Va.

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available.

ELECTRICAL ENGINEERS MEETING—Fall general meeting of the American Institute of Electrical Engineers, at the Hotel Morrison, Chicago, Ill. Secretary of the Institute, 33 West 39th St., New York 18, N. Y.....**OCTOBER 11-15, 1954.**

(*Concluded on page* 156)

YOU WILL FIND MANY PROFITABLE IDEAS IN PHILADELPHIA

Dec. 2-3-4-6-7
1954

21st NATIONAL POWER SHOW

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING

COMMERCIAL MUSEUM — PHILADELPHIA

Five fact-filled days at the Power Show can save you months of tiresome and expensive research by providing the ideas for your improved plant operation.

Visit the technically staffed booths of the country's leading manufacturers of mechanical, steam, electrical, hydraulic and pneumatic power equipment for the latest word in power technology.

You will learn how to increase production, improve product design and reduce maintenance costs at a minimum expenditure of your valuable time.

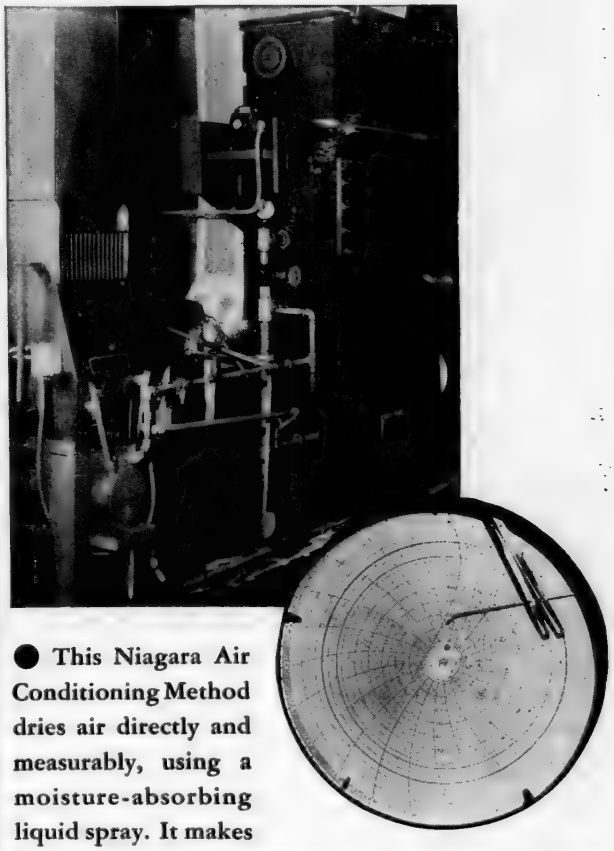
PLAN NOW TO ATTEND

Write early for hotel reservations and advance registration

Under the auspices of the ASME

Management: **International Exposition Co.**
480 Lexington Avenue, New York 17, N. Y.

EXACT CONTROL
of Moisture Content
To Improve Your Product or Protect Your Materials or for Processes or Tests



● This Niagara Air Conditioning Method dries air directly and measurably, using a moisture-absorbing liquid spray. It makes humidity control a separate function from lowering or raising temperatures and gives you precise control with thermostats alone; no moisture-sensitive devices are needed. You have simpler, more trustworthy, less expensive control instrumentation. Niagara precise-control installations have the best record for reliability.

Niagara Air Conditioning provides you with any temperature and relative humidity you need. Using "Hygrol" absorbent, it is not expensive to operate, saving the refrigeration commonly used to condense moisture and making re-heat unnecessary in most cases. It gives large capacity with compact, easily-maintained equipment. Ask for Descriptive Bulletins #112 and #121. Address Dept. — HV.

NIAGARA BLOWER COMPANY
405 Lexington Ave. New York 17, N. Y.
District Engineers in Principal Cities of U. S. and Canada

Shed those design shackles, specify

AGITAIR

You can give free rein to your creative planning and still rely on AGITAIR square and rectangular diffusers to provide draftless air distribution from any location. Custom-designed, with built-in diffusing vanes, in a wide variety of louvered patterns, they provide blows in 1, 2, 3 or 4 directions without use of blank-offs. AGITAIR diffusers need not be centrally located in an area if such placing does not agree with the decorative motif, or if a beam or other obstruction is in the way.

Moreover, AGITAIR square and rectangular diffusers are now available with or without removable, interchangeable cores. AGITAIR also brings you Stripline, the slender, continuous air diffuser with unlimited application versatility.

New 34-page Type R Catalog reveals how correct air distribution is simplified by AGITAIR. Contact your local AGITAIR representative, or write us direct for your free copy.

AIR DEVICES INC.
185 Madison Avenue, New York 16, N. Y.

AIR DIFFUSERS • FILTERS • EXHAUSTERS

(*Concluded from page 154*)

SAFETY CONGRESS AND EXPOSITION—42nd National Safety Congress and exposition, of the National Safety Council, at Chicago, Ill. R. L. Forney general secretary of the Council, 425 No. Michigan Ave., Chicago 11, Ill. . . . **OCTOBER 18-22, 1954.**

ASA CONFERENCE—Fifth national conference on Standards and 36th annual meeting of the American Standards Association, at the Roosevelt Hotel, New York, N. Y. Secretary of the Association, 70 East 45th St., New York 17, N. Y. . . . . **NOVEMBER 15-17, 1954.**

REFRIGERATION SERVICE ENGINEERS CONVENTION—17th Annual convention of the Refrigeration Service Engineers Society, at the Raddison Hotel, Minneapolis, Minn. Secretary of the Society, 2577 No. Teutonia Ave., Milwaukee 6, Wis. . . . . **NOVEMBER 18-21, 1954.**

ASME MEETING—Annual meeting of the American Society of Mechanical Engineers, at the Statler Hotel, New York City. Secretary of the Society, 29 W. 39th St., New York City. . . . . **NOVEMBER 28-DECEMBER 3, 1954.**

ASRE CONVENTION—50th Annual convention of the American Society of Refrigerating Engineers at the Benjamin Franklin Hotel, Philadelphia, Pa. M. C. Turpin, secretary of the Society, 234 Fifth Ave., New York City, N. Y. . . . . **NOVEMBER 28-DECEMBER 1, 1954**

POWER SHOW—21st National Exposition of Power and Mechanical Engineering, at the Comercial Museum, Philadelphia, Pa., to be held under the auspices of The American Society of Mechanical Engineers. E. K. Stevens, International Exposition Co., 480 Lexington Ave., New York 17, N. Y. . . . . **DECEMBER 2-7, 1954.**

NATIONAL RETAIL INDUSTRY SHOW—First National Retail Industry Show of the Store Modernization Institute, combined with the 5th Store Modernization Show at Madison Square Garden, New York, N. Y. John W. H. Evans, secretary of the Institute and managing director of the Show, 20 E. 55th St., New York, N. Y. . . . . **JANUARY 7-11, 1955.**

SOLAR ENERGY SYMPOSIUM—A world symposium on applied solar energy, sponsored by Stanford Research Institute, Stanford, Calif. at the Westward Ho Hotel, Phoenix, Ariz. Chairman of the Institute, 612 S. Flower St., Room 332, Los Angeles 14, Calif. . . . . **JANUARY 12-15, 1955.**

ASHVE MEETING—61st annual meeting of the American Society of Heating and Ventilating Engineers, at the Benjamin Franklin and Bellevue-Stratford Hotels, Philadelphia, Pa. A. V. Hutchinson, executive secretary of the Society, 62 Worth St., New York 13, N. Y. . . . . **JANUARY 24-27, 1955.**

HEATING & VENTILATING EXPOSITION—12th International Heating & Ventilating Exposition, at the Commercial Museum and Convention Hall, Philadelphia, Pa., held under the auspices of the American Society of Heating and Ventilating Engineers. E. K. Stevens, International Exposition Co., 480 Lexington Ave., New York 17, N. Y. . . . . **JANUARY 24-28, 1955.**

TESTING MATERIALS MEETING—1955 spring meeting of the American Society for Testing Materials, at the Netherland-Plaza Hotel, Cincinnati, Ohio. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa. . . . . **JANUARY 31-FEBRUARY 4, 1955.**

INDUSTRIAL VENTILATION CONFERENCE—The 14th Annual Conference for bringing together plant engineers, contractors and others interested in industrial ventilation, is co-sponsored by Michigan Department of Health, Division of Occupational Health, and Michigan State College, School of Engineering. Held at Kellogg Center, Michigan State College, East Lansing, Michigan. James C. Barrett, Ventilation Engineer, Division of Occupational Health, Michigan Department of Health, Lansing 4, Michigan. . . . **FEBRUARY 14-17, 1955.**

OIL HEAT CONVENTION—33rd annual convention of the Oil-Heat Institute of America, tentatively set for the Edgewater Beach Hotel, Chicago, Ill. R. H. L. Becker, secretary of the Institute, 500 Fifth Ave., New York 36, N. Y. . . . . **APRIL 4-7, 1955.**

LUBRICATION ENGINEERS MEETING—Annual meeting and exhibit of the American Society of Lubrication Engineers, at the Hotel Sherman, Chicago, Ill. Wm. P. Youngclaus, Jr., secretary of the Society, 84 E. Randolph St., Chicago 1, Ill. . . . . **APRIL 13-15, 1955.**

INTERNATIONAL CONGRESS OF REFRIGERATION—Ninth International Congress of Refrigeration, sponsored by the International Institute of Refrigeration, to be held in the conference rooms of the Sorbonne in Paris, France. General Secretariat of the Congress, International Institute of Refrigeration, 177, Boulevard Malesherbes, Paris, France . . . . . **AUGUST 31-SEPTEMBER 15, 1955.**

PIPING AND PLUMBING

(*Concluded from page* 110)

problems that satisfy particular requirements of a proposed project.

Without an interceptor the flow of water from the footing drainage system, because of its low velocity, would leave deposits of sand or earth in the storm water system. Such deposits could cause line stoppage or sluggish action in this system, which would be troublesome during a storm. During a storm, storm water quickly passes through the storm water system whereas the water from the footing drains reaches this system much later depending on the percolation rate of the soil through which the surface water must seep before it reaches the footing drainage system.

If the storm water line is at a higher elevation than the footing drainage system, it is then necessary to conduct the water from the interceptor to a sump pump, through which it is raised to a sufficient elevation to drain by gravity into the storm water line. If a sump pump is required, it is usually located in the basement or cellar of the building, for easy access and protection of the motor and controls. Generally, when the sump pump is placed in the building, the interceptor is also placed in the building near the sump pit. The sand interceptor prevents the sump basin from acting as an interceptor and also avoids the damage that the sand or earth could cause to the pumping equipment. It is very important that the local authorities or code be checked for additional requirements relating to the piping hook-up between the interceptor and the point of discharge or between the sump pump and the point of discharge.

These suggestions apply to a complete system around a building or to a system serving just a part of a building. A well designed footing drainage system will provide for years of trouble-free operation and will function in the most efficient manner.

NEWS OF THE MONTH

(*Continued from page 148*)

REUBEN TRANE

dies at La Crosse after long illness. Founded Trane Co. with father in 1913.

Reuben N. Trane, former president and chairman of the board and one of the founders of the Trane Co., La Crosse, Wis., died at La Crosse Sept. 5 following a long illness.

• **FOUNDER.**—With his father he incorporated the Trane Co. in 1913, and the company is now one of the nation's major producers of air conditioning and heating equipment. He was president of the company from 1916 to 1951, and chairman of the board until his retirement in December, 1953.

A graduate from the University of Wisconsin in mechanical engineering, Mr. Trane worked as a sales engineer until he formed his company, which built its first plant in La Crosse in 1919.

(*See News Briefs on page 158*)

No need to improvise or compromise when you specify

AGITAIR

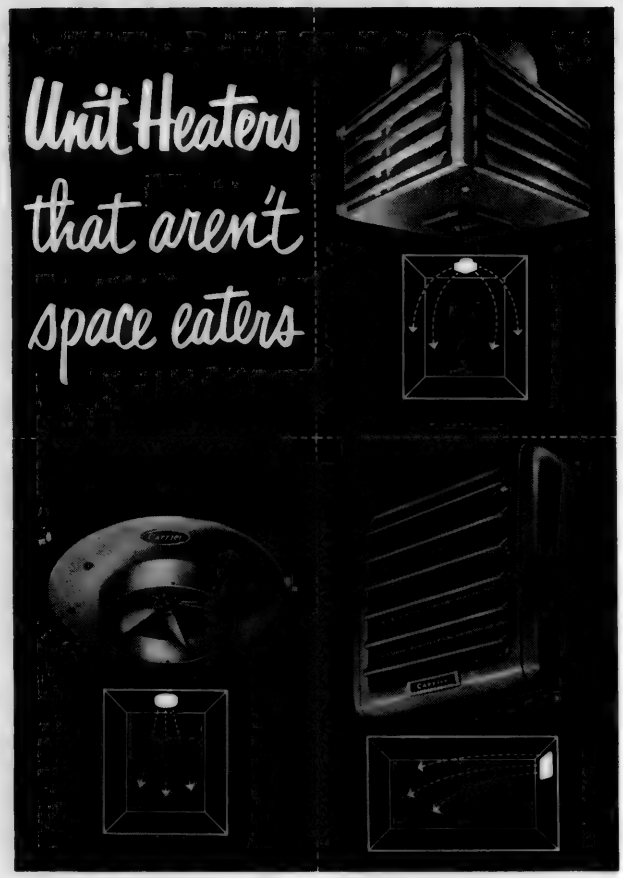
Only AGITAIR square and rectangular air diffusers are custom-made to suit conditions of each application. The patented, built-in diffusing vanes are scientifically arranged in various louve patterns which provide blows in 1, 2, 3 or 4 directions without use of blank-offs. This feature eliminates the necessity of "oversizing" to compensate for blank-offs or baffles.

When you specify AGITAIR square and rectangular diffusers you can be sure of 100% draftless air distribution from any ceiling or sidewall location. What's more, these smart, modern units are now available with or without removable, interchangeable cores. Whatever the space condition, there's an AGITAIR custom-made to give perfect performance and complete satisfaction.

New 34-page Type R Catalog reveals how correct air distribution is simplified by AGITAIR. Contact your local AGITAIR representative, or write us direct for your free copy.

AIR DEVICES INC.
185 Madison Avenue, New York 16, N. Y.

AIR DIFFUSERS • FILTERS • EXHAUSTERS



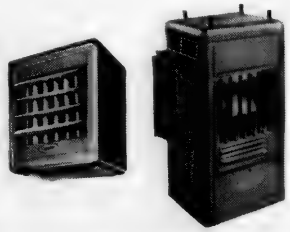
Not only are Carrier Unit Heaters for steam and hot water designed for out-of-the-way installation, but compactness enables them to take up little space anywhere. Efficiency, styling, controls and dependability reflect Carrier's high-class engineering. Quality materials and sturdy, long-lasting construction are evidence of conscientious manufacture.

CARRIER Projection Unit Heater (lower left). This single discharge high ceiling type unit with wide selection of outlet diffusers is available in seven sizes and a choice of coils for low or standard temperature rise. Capacities from 32,000 to 492,000 Btu per hour.

CARRIER Four-way Directed-flo Unit Heater (top). Through independently controlled warmed air streams from four easily adjusted outlets, and from heights up to 30 feet, this unit provides quick heat *in any direction, at any angle, in any capacity* within the respective ranges of its seven sizes —82,000 to 500,000 Btu per hour.

CARRIER Propeller-fan Horizontal Air Discharge Unit Heater (lower right) delivers warmed air horizontally through adjustable discharge louvres in any capacity within the respective ranges of its ten sizes of 21,000 to 200,000 Btu per hour.

CARRIER Gas-fired Unit Heaters are AGA-approved for all gases. Duct type at right. Propeller-fan type at left (made also in larger design for the higher capacities). Solidly built —featuring exclusively *16*-gauge ALUMINIZED STEEL heat exchanger. Capacities range from 50,000 to 230,000 Btu per hour input.



For further information, WRITE Carrier Corporation, Syracuse, New York.

Carrier

AIR CONDITIONING
REFRIGERATION
INDUSTRIAL HEATING

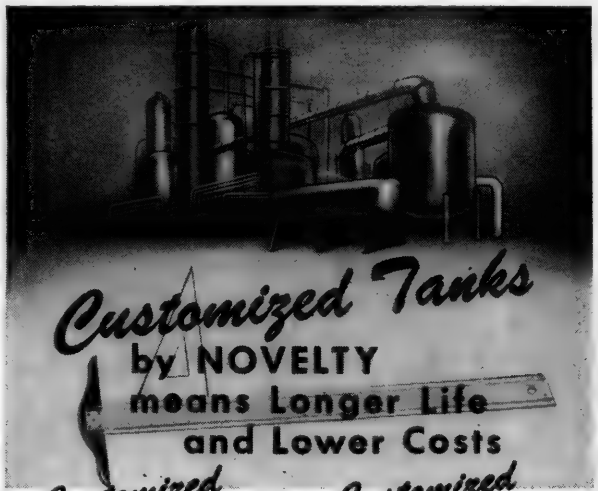
NEWS BRIEFS (*Continued from page* 157)

• The U. S. Air Force has placed an order for portable air heaters in excess of $500,000 with the American Air Filter Company. This supplements an order received earlier this year for portable air heaters in excess of $1,200,000. Manufacture of the heaters will take place in the company's Herman Nelson Division plants in Moline and Morrison, Ill. Used under cold weather conditions to preheat airplane engines, the heaters are designed to operate at full output down to minus 65 degrees.

• Warren Webster & Co. has appointed Don F. Bennett as vice-president in charge of sales. Newton W. MacNichol becomes manager of radiation and unit heater sales, succeeding Mr. Bennett. John J. Carroll, purchasing agent and a director, was appointed assistant treasurer.

• Harold N. Jones has been named general sales manager of the Utica Radiator Corp. Recently resigned as sales manager of the Burnham Boiler Division, Burnham Corporation, he had served in that capacity since 1950. Francis R. Brennan will assume the position of director of sales promotion. Mr. Brennan has been with the company 20 years.

• Hobart C. Ramsey, president of Worthington and Harold P. Mueller, Sr., formerly president of L. J. Mueller Furnace Company, and now president of the Mueller Climatrol Division, Worthington Corporation, announced completion of the acquisition of the furnace company, effective July 30. The stockholders of Mueller previously approved the sale of the company's name, assets and good will to Worthington, in exchange for Worthington stock.



Customized **FABRICATION**

Let us assist in the engineering of systems that require tanks—by offering suggestions in fabrication economies. At your disposal is our many years of experience in selecting and processing materials for building tanks of steel, stainless steel, copper, nickel, monel and all clads.

Customized **LINING**

Let our Novelon Lining Department offer their suggestions as a solution to your storage problem. Considerable savings are often possible by specifying a time-tested lining as an alternate to far more expensive steel alloys—with protection against corrosion guaranteed.

For free literature and information write or phone . . .

NOVELTY STEAM BOILER WORKS, INC.

Quality Fabricators for 50 Years

Clare and Kloman Sts. —ARROW— STEEL TANKS —BALTO— Baltimore 30, Maryland

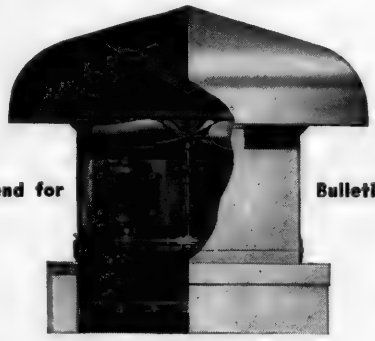
Telephones: Baltimore PLaza 2-0425 • New York BAyside 5-[illegible]

VENTILATING PROBLEM ?

WE CAN HELP YOU

BURT ENGINEERS — WITH MORE THAN HALF A CENTURY OF PRACTICAL EXPERIENCE IN DESIGNING, MANUFACTURING AND RECOMMENDING VENTILATORS—ARE AT YOUR SERVICE.

Without obligation, you can call upon Burt engineers to help solve your ventilating problems. Their technical know-how is supplemented by thousands of successful Burt Ventilator case histories to prove or disprove the slide-rule. Burt is not interested in selling a specific model because Burt manufactures all types, all sizes of ventilators. That's why Burt's recommendations can be unbiased—a real assurance of satisfaction.



Send for Bulletin SPV-101E

FAN & GRAVITY VENTILATORS • LOUVERS • SHEET METAL SPECIALTIES

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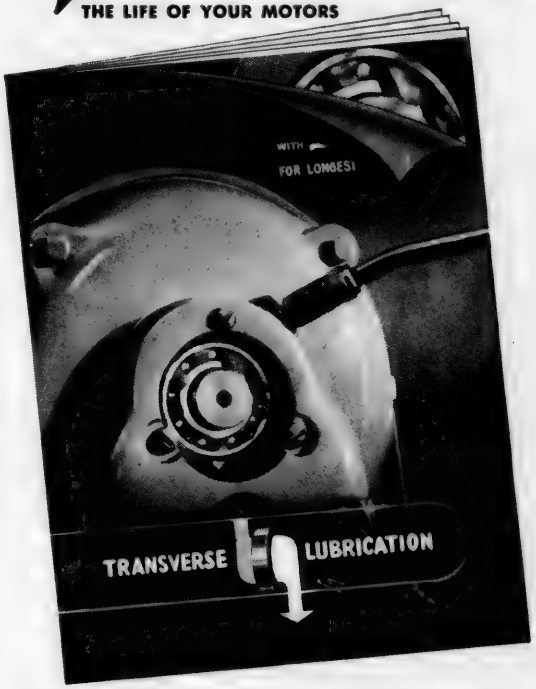
Member Power Fan Manufacturers Association

Startling Facts ABOUT MOTOR BEARING LUBRICATION

FREE !

THIS FULL COLOR PROFUSELY ILLUSTRATED BOOKLET OF FACTS THAT HAVE A *BEARING* ON THE LIFE OF YOUR MOTORS



The booklet illustrates the three principal types of bearings used in motors – cartridge, one-side lubrication and Lubriflush – with explanations of the functions of each. For demonstrating the action of re-lubrication in the U. S. Lubriflush bearings, a transparent bearing housing is dramatically illustrated by a series of natural color photos. This informative educational booklet, edited by lubrication engineers, is full of startling facts you should know. Write today for a complimentary copy. Simply fill in the Coupon below.

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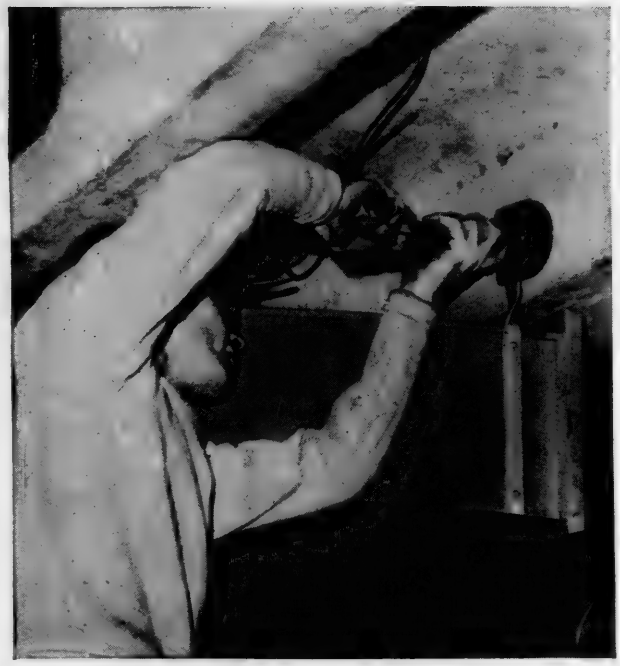
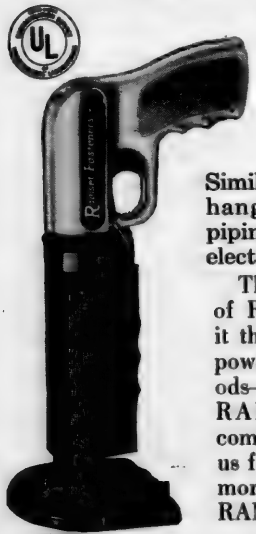


Ramset SAVES $11,000

for Fastening Air Ducts in Texas' Largest Store

More than two miles of air conditioning ducts were installed with RAMSET SYSTEM in the new addition to Joske's Department Store at San Antonio, Texas, the "largest store in the largest state."

By using RAMSET Jobmaster, anchoring studs were set at the rate of better than 1 per minute, instead of an estimated 15 minutes each by old-fashioned, conventional methods. Substantial cost savings were thus gained, as well as a far faster, completely secure installation. Similar results were obtained for hanging 13 miles of sprinkler piping and anchoring 43 miles of electric conduit.



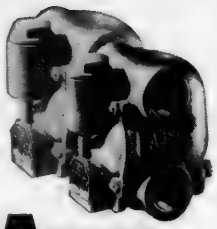
The high speed and wide utility of RAMSET SYSTEM have made it the 2-to-1 favorite over all other powder-actuated fastening methods—and more contractors use RAMSET than all other makes combined. Ask your dealer or write us for details on how you can make more profit from every job by using RAMSET SYSTEM.

Ramset Fasteners, INC.

Ramset Division, Olin Industries, Inc.

12135 BEREA ROAD • CLEVELAND 11, OHIO

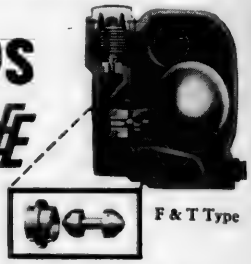
FIRST IN POWDER ACTUATED FASTENING — AN Olin PRODUCT



ADSCO

WHEN the valve and valve seat of an ADSCO Dual Steam Trap become worn, neither these parts nor the trap itself need to be replaced. Merely reverse the valve and seat by a simple operation and you double the life of the trap...

DUAL TRAPS LEAD A DOUBLE LIFE



F & T Type

...And here's another great feature of ADSCO Traps. All working parts are mounted on the cover. Pipe connections do not have to be broken for inspection or service...ADSCO Dual Steam Traps are extremely compact with large capacity. Dual inlet and outlet connections reduce installation costs. In the type shown here, an internal thermostatic element provides an automatic air bypass...For complete information, call an ADSCO representative or write the factory.

AMERICAN DISTRICT STEAM COMPANY, INC.

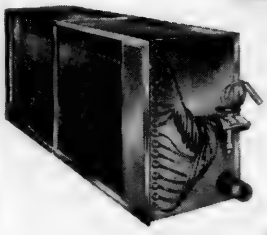
GENERAL OFFICES
NORTH TONAWANDA, NEW YORK
PLANTS: NORTH TONAWANDA, N. Y., AND RICHMOND, CALIF.

Industry Had Acid Vapor Heating and Cooling Problems

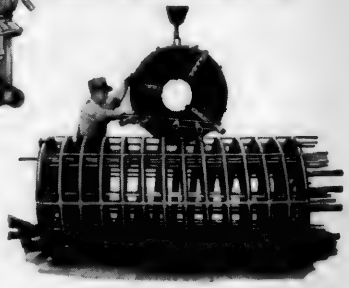
REMPE

Solved Them With...

FIN AND PIPE COILS OF STAINLESS STEEL



Rempe Fin Type Coils are ideally suited for handling all types of corrosive air mixtures, gas or liquid, heating or cooling needs.



We have complete facilities and tested technique in the fabrication, welding and finishing of pipe coils made from all types of stainless steel.

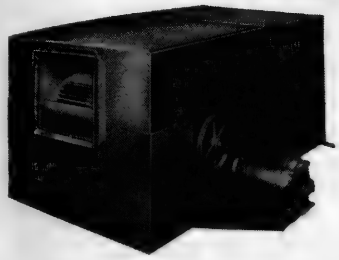
Send details or blueprints for engineering advice and quotations on your requirements, for all types, all materials of pipe and fin coils.

REMPE COMPANY

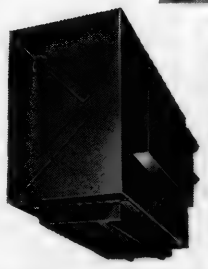
358 N. SACRAMENTO BLVD., CHICAGO 12, ILL.

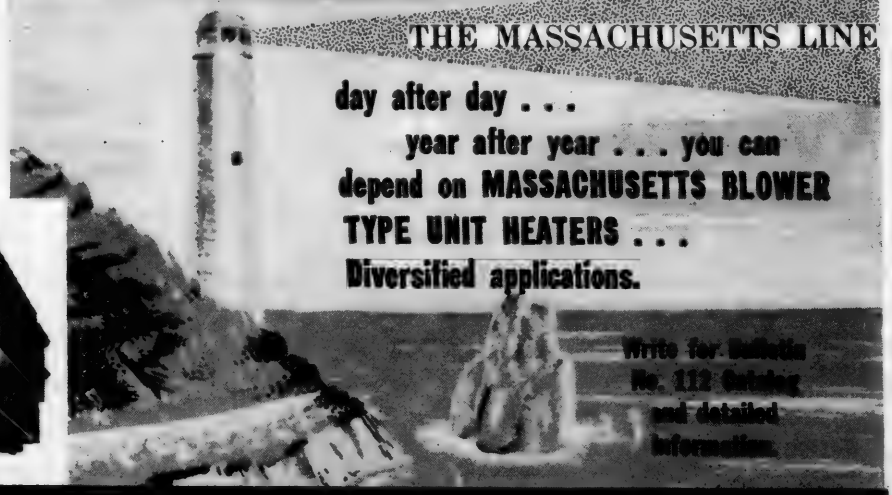
The MASSACHUSETTS Line®

DEPENDABILITY



CEILING TYPE UNIT HEATER WITH FILTER AND DAMPER SECTION





MASSACHUSETTS BLOWER DIVISION

The BISHOP & BABCOCK Mfg. Co.

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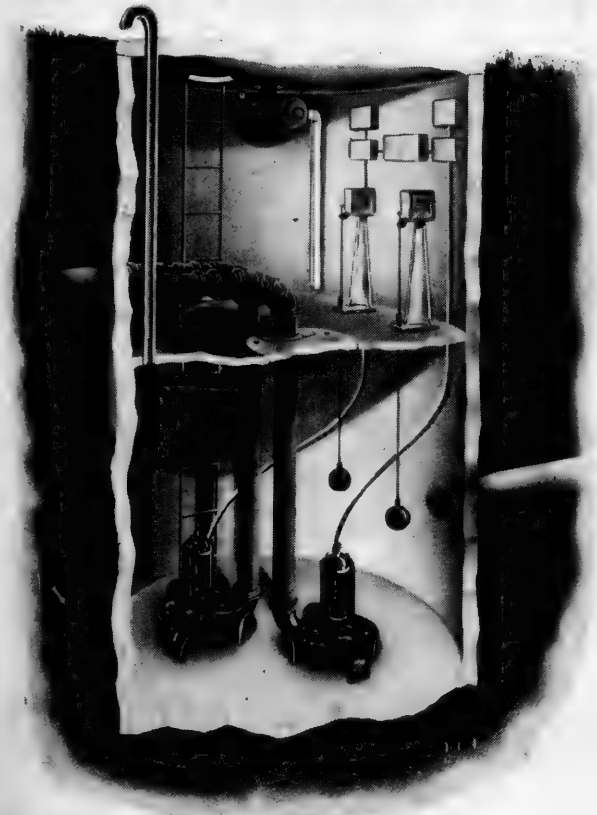
The SUBMERSIBLE SEWAGE EJECTOR



Engineered for

HEAVY DUTY INDUSTRIAL DRAINAGE

The WEIL NON-CLOG Screenless Submersible Sewage Ejector with the BLADELESS impeller will pump ALL sewage and industrial waste — even rags.

Ideal for installation where flash floods caused by heavy rainfall create a heavy drainage load. Operates completely submerged. The motor is water cooled, the entire unit water-proof.

The motor, hermetically sealed, the housing, drive shaft and impeller are an integral unit. Sealed bearings are especially lubricated for five year operation without attention.

Illustration shows an economical outdoor installation which does NOT require a PUMP HOUSE to mar the landscape. This reduces the overall cost of an outside pumping station. Indoor installation does not clutter up valuable floor space with pump motors, controls, etc.

Capacities: 35 to 1,250 GPM with heads to 45 feet
Discharges: 3" and 4" — ½ to 15 H.P. motors

Send for Bulletin SE 860 B with plans and specifications for various types of underground installations.

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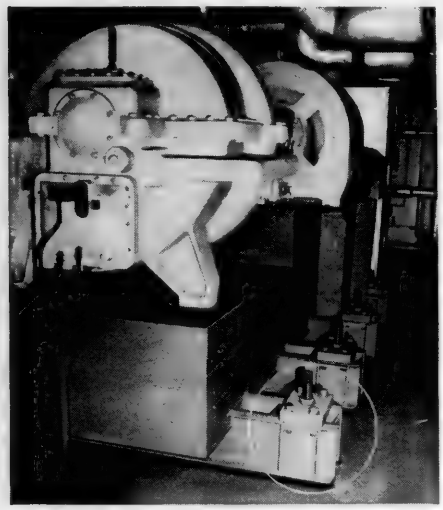
1516 NORTH FREMONT STREET • CHICAGO, ILLINOIS

In this "Drive-In" Office Building

KORFUND VIBRATION CONTROL *allows more rentable space*

A feature of the Cafritz Building in Washington, D. C., makes it possible to drive your car up a series of ramps, and park it outside your office door.



The Cafritz Building, Washington, D. C.
LeRoy L. Weiner Architect
William A. Brown Consulting Engineer
Cafritz Construction Company Builder
Mehring & Hanson Company Mechanical Contractors

Another feature is this 530 Ton Centrifugal Refrigeration Machine installed on the roof. Korfund Steel Spring Vibro-Isolators with adjustable leveling bolts (a Korfund feature for over 30 years) made this installation possible, since they completely prevent vibration and noise transmission even to floors directly below. This makes available more revenue-producing space elsewhere in the building.

This is just one of hundreds of successful upper floor installations of heavy air conditioning equipment on Korfund spring isolators. Only Korfund Vibro-Isolators allow really heavy upper floor installations without floor reinforcement and with positive assurance of vibration and noise control.

Utilize all possible revenue-producing space — move air conditioning equipment upstairs. Korfund experience makes it possible. There is no substitute for experience.

For more information, write for your copy of Bulletin 23, or see our catalog in Sweet's Files.

For specific recommendations, contact us or your local Korfund Office. Look under "Korfund" in your local Telephone Directory or Thomas' Register. A half-century of experience is at your disposal.

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THE KORFUND CO., INC.

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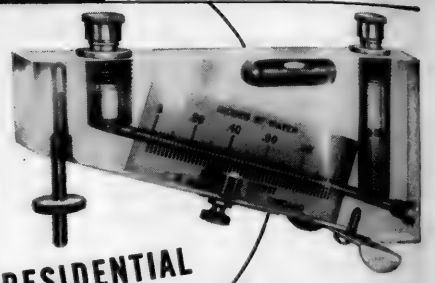

TELLS YOU THE EXACT BLOWER SPEED FOR RESIDENTIAL AIR CONDITIONING SYSTEMS....

Foolproof...determines the correct air volume the only practical way...by measuring the static pressure drop, in inches of water, across the system's evaporator.

Pocket-Size...$6\frac{3}{16}$"x4"x1" gage comes in 8"x7" plastic pouch with rubber tubing, tapered connectors, pressure tips, spring holders, gage oil.

Break-Proof...solid transparent plastic block — almost indestructible.

Accurate...no delicate or moving parts to get out of order–remain accurate constantly and permanently.

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FOR TOP PERFORMANCE...

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TURBINE VENTILATORS

Accurately rated, wind-driven Allen Turbine Ventilators are doing a noteworthy air-displacing job on commercial and industrial rooftops all over the country. Ruggedly built of prime sheets of heavy-gauge coated iron, (special, non-ferrous metals also available), these almost noiseless ventilators are in stock, ready for immediate delivery to you. Throat diameters, 6 to 48 inches. Economical to install and maintain, Allen Turbine Ventilators give maximum performance per dollar spent. Another type, motor-equipped Electro-Wind Turbine Ventilator, is available for use in areas where wind velocities are not always sufficient. Engineering assistance gladly furnished. Our representatives are in most principal cities; names listed in our catalog in Sweet's Architectural File, Section 20b.

Allen Type "C" Wind-driven Turbine Ventilator

Write for catalog on complete line of roof ventilators.

ALLEN ENGINEERED VENTILATION

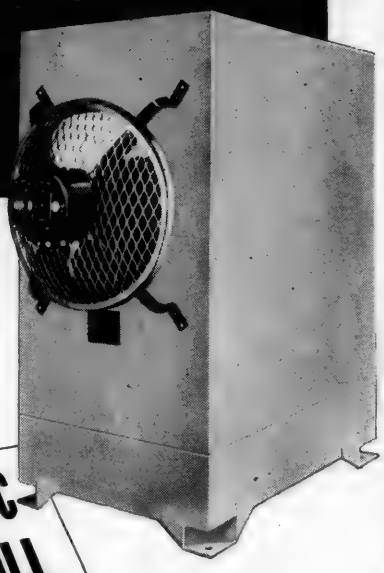
ALLEN COOLER & VENTILATOR INC.
ROCHESTER, MICH.

Roof Ventilators for Every Commercial and Industrial Need

COOLING TOWER

by

KRAMER



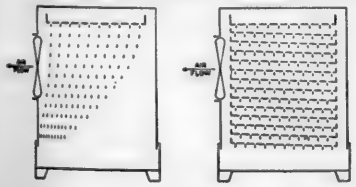
3 to 8 Ton

SCIENTIFIC NEW FILL

MORE CAPACITY
The redistributing decks keep the water uniformly suspended, providing maximum contact between air and water.

LONG LIFE
Casing and sump are heavy gauge steel, hot dipped galvanized after fabrication. Redistributing decks are metal and fireproof.

EASY INSTALLATION
Unit is shipped assembled but can be knocked down to eliminate rigging costs. One fitting required for drain and over-flow.



Conventional Fill — Kramer Fill

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KRAMER TRENTON CO.
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Taco
HEAT EXCHANGERS

3 WAYS BETTER

1. Designed for maximum operating efficiency and rapid heat transfer.
2. Built for optimum performance and life . . . expanded joints, electronically rolled, free of rubbing, noise or wear.
3. Engineered to suit your requirements by experienced Taco Field Engineers . . . who help you select exactly the right heat exchanger for your job from the wide range of units made by Taco.

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Tank Heating Units

Condensate Coolers
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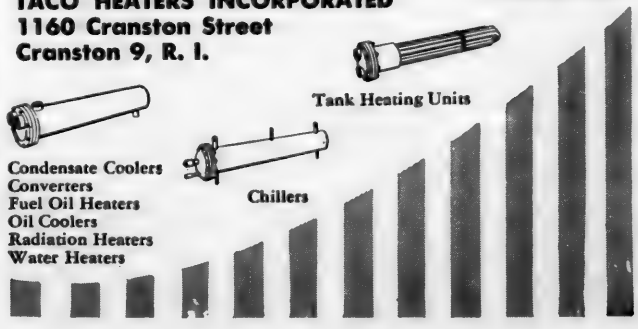
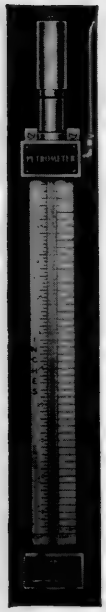




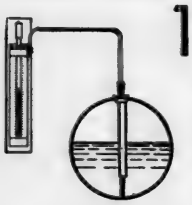
4 steps

to Better Measurement of Tank Contents

The PETROMETER

Tank Gauge offers you the convenience of Remote Reading plus these four extra features:

SIMPLE, TROUBLE-FREE DESIGN • • • No complicated and troublesome pulleys, springs, or other mechanical or electrical gadgets—the Petrometer gauge operates on the principle of static pressure—a principle that is as unfailing as the law of gravity. Its operation is similar to that of the familiar U-tube. Simple, rugged and dependable.

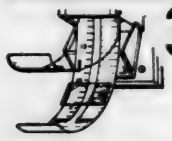


1

CONSTANT ACCURACY • • • The large vertical scale on the Petrometer gives you constant, accurate readings. The red liquid column is clearly visible—moves up and down as contents vary, just like the liquid level in your tank.

2

INTERCHANGEABLE SCALES • • • The scale on the Petrometer is readily removed or adjusted to correct for tank pitch or when changing liquids. No tools are needed.



3

EASY INSTALLATION • • • Gauges can be installed on tanks above or below the ground and up to ¼ mile away. The tank assembly for the gauge can be installed even when the tank contains liquid. It can also be fitted in the tank separately to complete the tank work and the gauge connected any time later. Just tighten one simple connection and installation is complete.

4

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7

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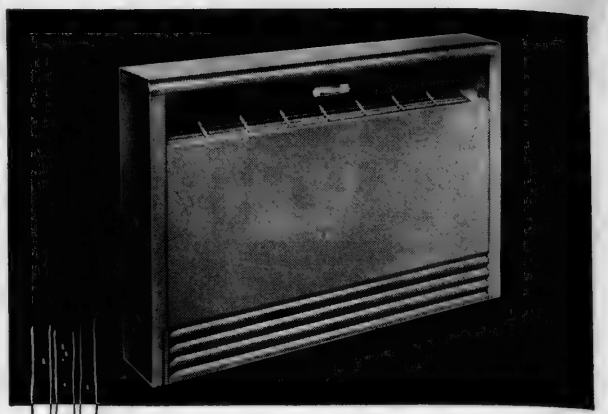

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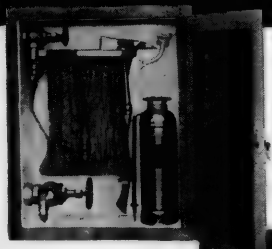

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get the inside story

on your **AIR FILTERS**

at a glance!

HAYS AIR FILTER GAGES

With an air filter gage you measure the resistance that air meets in passing through a filter—you get the *inside story* at a glance.

A dirt-clogged filter in air circulating or air conditioning systems lowers efficiency and costs you money. Needless changing of filters to avoid clogging is expensive. A small investment in a Hays air filter gage removes this guesswork . . . results in real savings.

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- ***constant accuracy*** — **Hays' special "slack diaphragm" retains accuracy.**
- ***easy zero check***—**external zero adjusting screw provided.**

Gages can be furnished with contacts for flash or sound alarms or with damper controls. Portable models also available.

For complete details on Hays Air Filter Gages, write for Bulletin 54-751-12.

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type AC centrifugal pump for air conditioning systems

When outside atmospheres are laden with abrasive dust particles, recirculation of cooling water in air conditioning systems using cooling towers becomes a major maintenance headache. Shaft seals become worn far more quickly than normal and leakage occurs.

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PARACOIL Units For All Air Conditioning and Refrigeration

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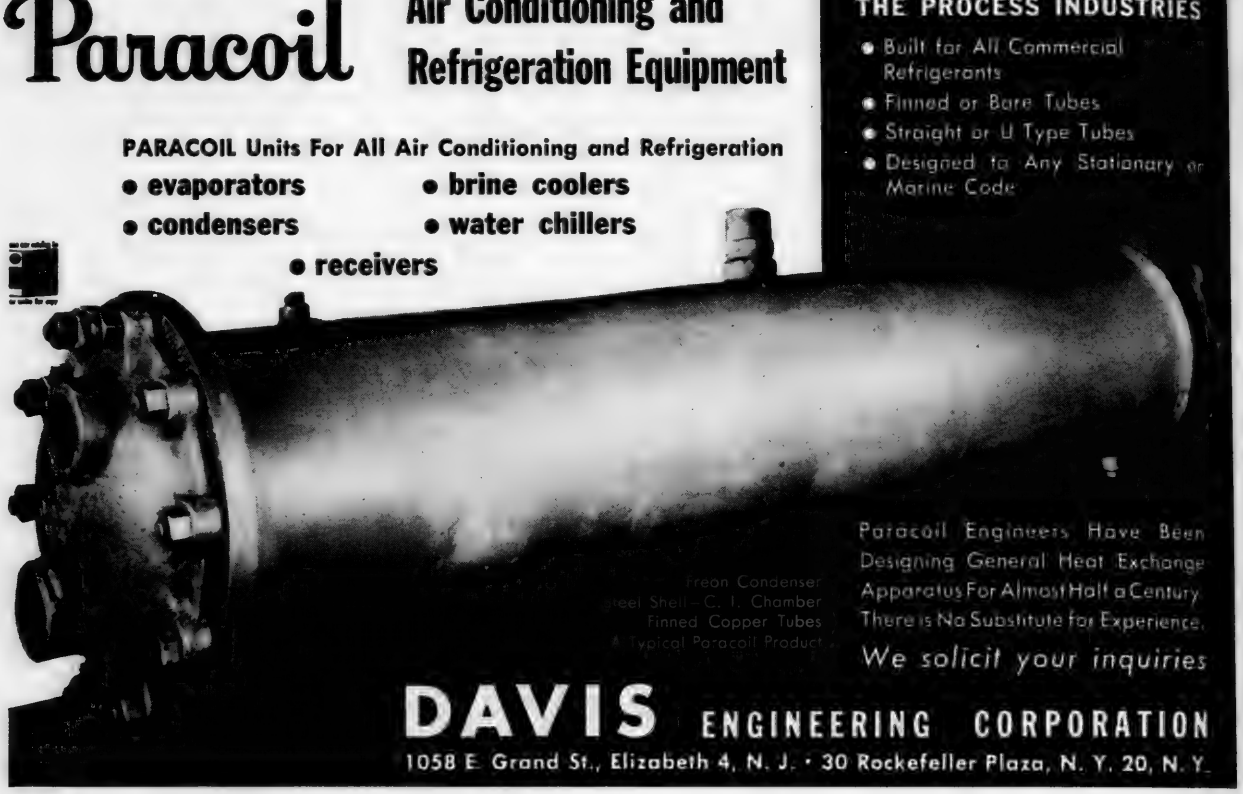

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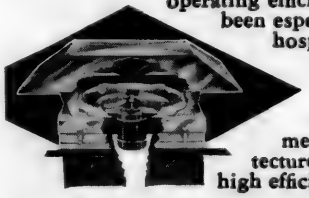

Totally enclosed motor mounted on vibration separators. Easy to install—heavy gauge steel, electric welded, 31 sizes—250 CFM to 17600 CFM.

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STEAM COILS AT SAVINGS
Large stock of copper Blast coils in stock for heating.
Send for current stock list.
AIR CONDITIONING ENGINEERING CO.
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Advertisements in HEATING AND VENTILATING'S Classified Advertising Section bring results! Rates are 15 cents a word (minimum charge $3.00); or $8.00 a single column inch.

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148 Lafayette St., New York 13, N. Y.

FAN & BLOWER ENGINEER
Experienced engineer required by manufacturer of fan and blower equipment. Duties involve estimating, supervision of development and testing work. State experience and salary requirements. Reply to Box No. 836, HEATING AND VENTILATING, 148 Lafayette St., New York 13, N. Y.

MANUFACTURERS AGENTS wanted—exclusive territory will be granted to qualified persons—for automatic electric damper control for coal, gas or oil fired boilers. Box No. 830, HEATING AND VENTILATING, 148 Lafayette St., New York 13, N. Y.

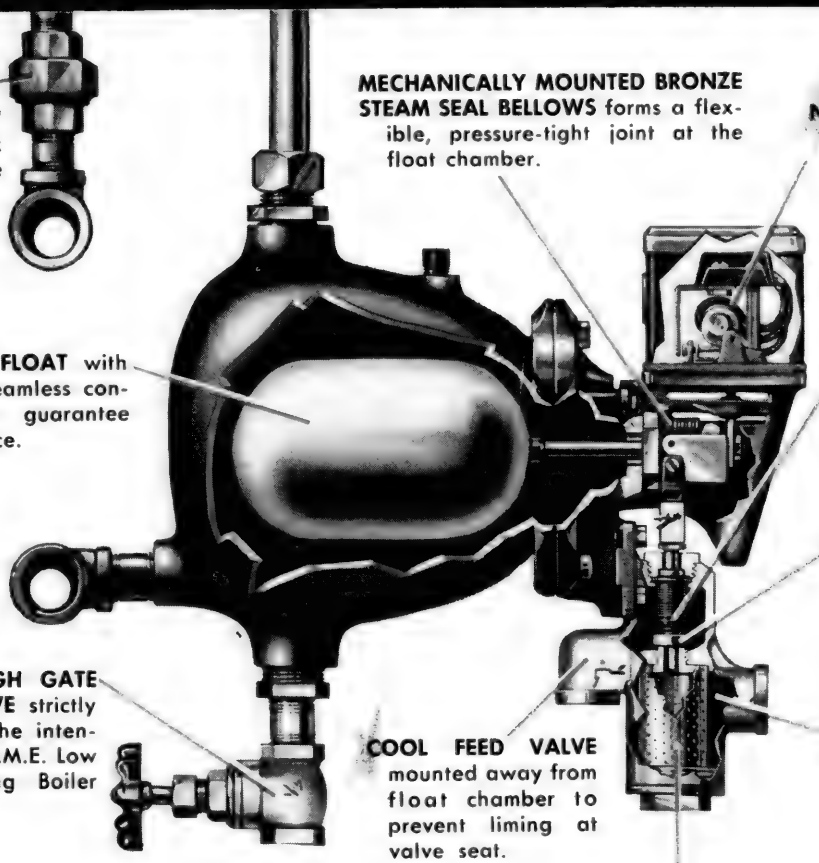
SINCE WATTS 1875

WATTS

NEWLY RE-DESIGNED

60LWD Boiler Water Feeder

FOR LOW PRESSURE SPACE HEATING STEAM BOILERS



QUICK HOOK-UP ½" fittings for quick and easy gauge glass connection.

MECHANICALLY MOUNTED BRONZE STEAM SEAL BELLOWS forms a flexible, pressure-tight joint at the float chamber.

NEW MERCURY SWITCH DESIGN has no mechanical parts to stick or fuse.

PURE COPPER FLOAT with reinforced seamless construction to guarantee lifetime service.

FATIGUE-RESISTANT bron water seal bellows prov a pressure-tight seal keeps the valve stem g dry so that it cannot cor or stick.

WATTS FEED VALVES feature resilient, stick proof disc-to-metal sea that will not leak.

STRAIGHT-THROUGH GATE TYPE DRAIN VALVE strictly complies with the intentions of the A.S.M.E. Low Pressure Heating Boiler Code.

COOL FEED VALVE mounted away from float chamber to prevent liming at valve seat.

ENLARGED STRAINER area and sediment space pro vides an ample free-flow safety factor.

HEAVY GAUGE perforated copper strainer. Easily removed for cleaning.

WATTS 60 SERIES. Recently added refinements to the proven design of the Watts No. 60 establishes its unquestionable leadership in today's design of boiler water feeders. No better protection can be found.

No. 60 boiler water feeder only (without cut-off switch) for manually-fired steam boilers. An LWD mercury switch assembly may be added in the field at any time to make a combination boiler feeder and low water cut-off for automatic firing.

No. 60LWD. This feeder consolidates the No. 60 with a mercury switch assembly to provide a combination feeder and cut-off with alarm switch.

Series 60 capacity up to 5,000 sq. ft. of radiation. Maximum steam pressure 35 lbs. Maximum water pressure 150 lbs. Has ¼" tapping for pressure switch. Water valve connections ½" S.P.S. Gauge glass connections ½" S.P.S. Height (float chamber only) 8½". Width 5½". Length 12½". Weight 30 lbs.

NOTE: These starred features above make Watts feeders the most advanced boiler water feeders available on the market today.

LITERATURE

WATTS REGULATOR COMPANY

LAWRENCE, MASSACHUSETTS U.S.A.

PROCEDURE IN PREPARING PLUMBING DRAWINGS

The step-by-step procedure which follows is based on practice recommended and used by the office of Syska & Hennessy, consulting engineers, New York, N. Y., and reproduced here by permission.

1. Count plumbing fixtures and estimate sizes of house sewers. Then size water service, and gas service, and estimate hot water load.
2. Determine if sump pumps or ejectors are required.
3. Determine if gravity or pneumatic tanks are required.
4. Locate roof drains, leaders, fire standpipe risers, main stacks, sprinkler alarm valves and risers.
5. Check if there are sufficient slop sinks, drinking fountains or water coolers with architect. Ascertain his desires regarding drinking fountains with tap water, drinking fountains with central chilled water, or unit water coolers.
6. Note lack of proper pipe spaces and wall thicknesses for plumbing work and check this lack with architect.
7. Notify electrical designer of electrical requirements of plumbing work.
8. Notify heating designer of domestic hot water requirements of plumbing work.
9. Ascertain drain, water and gas requirements from heating designer.
10. Check with heating and electrical designers regarding space conditions for risers, fire hose cabinets, and machinery room space.
11. Check structural drawings for space conditions affecting plumbing work.
12. Plumbing work shall be designed in accordance with local code; where no local code exists, check as to use of other codes as a standard.
13. All fire standpipe and sprinkler work shall be designed in accordance with local code, if one exists, and also in accordance with requirements of National Board of Fire Underwriters or Associated Factory Mutual Fire Insurance Companys. Ascertain from owner who his insurance agents are and consult with them regarding their fire protection requirements.
14. No plumbing piping shall be installed in transformer vaults, switchboard rooms, or telephone rooms unless absolutely necessary, and then electrical designer shall be notified so that he can arrange with architect for protection of the equipment by installation of a secondary slab between piping and their equipment where this is desired.
15. In general, floor drains shall be provided in the following locations: (a) Adjacent to all pumps, refrigeration compressors, air compressors, vacuum pumps, boilers, hot water heaters, and air conditioning equipment; (b) In kitchens near dishwashers, steam kettles, large refrigerators, and elsewhere as required; (c) In toilet rooms only on request of owner or architect.
16. In general, pressure reducing valves shall be provided for domestic water lines where static pressure exceeds 50 psi, and always where static pressure is 60 psi or more.
17. Water services shall be provided with the following: curb valve, two gate valves, meter, test tee, and pressure gauge. Where building has two or more services, each shall be provided with a check valve. All fire standpipe and sprinkler services shall be provided with a check valve unless meter with internal check valve is provided. Provide strainer ahead all domestic meters 3 inch and larger.
18. Hot water system shall be provided with a circulating return, unless distance between heater and farthest fixture is relatively short. Hot water systems with a horizontal loop or with long horizontal runs shall be provided with a circulator, if a small system, or a circulating pump, if a large system. The character of building use shall determine use of duplex hot water heating and circulating equipment.
19. Plumbing fixtures on floors below grade, if drained to sewer, shall be provided with backwater valves. In general, if fixtures are below rim of adjacent manholes, they shall be run to an ejector with a gravity by-pass.
20. Wherever possible, all water supplies to plumbing fixtures and other equipment shall be over the rim supplies. Necessary below rim water connections, water closet and urinal flushvalves, hose bibbs and hose connections (except sillcocks and fire hose outlets), water powered apparatus, and water connections to refrigerating compressors, boilers, or blow-off tanks, shall be provided with approved type vacuum breakers and/or check valves as required.
21. House pumps shall be provided with spring-loaded check valves instead of the swing checks used elsewhere. In New York City suction tank must be provided if house pump suction connection is 4 inch or larger. In such cases use three pumps, each carrying half the load wherever possible.

22. All risers shall be provided with control valves and drains.
23. Fire extinguishers of 2½ gal. capacity shall be provided in all fire hose cabinets and elsewhere as directed, 15 lb. carbon dioxide fire extinguishers shall be provided in boiler rooms, and 5 lb. carbon dioxide fire extinguishers shall be provided in kitchens and all rooms containing electrical switchboards and electrical motors.
24. Riser diagrams shall be drawn at ¼ inch scale whenever possible, but never less than ⅛ inch scale. Water service, hot water heaters, sump pumps, ejectors, house pumps, house tanks, and suction tanks shall be shown on riser diagrams.
25. Obtain minimum ceiling heights from architectural drawings or architect; check that plumbing work clears.
26. Hose bibbs should be installed in all machinery rooms, kitchens, incinerator rooms, and in all rooms containing floor drains but no water supplied fixtures.
27. Anti-freeze sillcocks shall be provided on outside of building and on all promenade roofs.
28. In general, piping shall be run as direct as possible. However, except for piping buried underground, all piping shall be run parallel to and at right angles to the walls and partitions, and shall be neatly grouped in parallel lines.
29. Piping rising within a story shall be noted as "Rise". Piping rising to another story shall be noted at "Up". Piping dropping within a story shall be noted as "Drop". Piping dropping to another story shall be noted as "Dn". Piping at the ceiling shall be noted as "At Ceiling", when exposed, and as "In Ceiling", when concealed. Piping under the floor, other than obvious fixture drain lines, shall be noted as "Under Floor", or "At Ceiling Below" as required.
30. Roof drains and stacks through roof shall be kept 12 to 18 inches away from parapet walls, building offsets, and roof openings to allow for proper flashing. All stacks through roof shall be at least 4 inches in size.
31. All three phase motor controllers, remote control stations, alarm panels, remote alarms, remote pressure switches, float switches, and electrode control units shall be located and noted on drawings.
32. Piping shall be run to clear steel and concrete beams where possible. Where absolutely necessary piping may be run through beams. Where it is necessary to clip beam flanges or run pipes through web of steel beams and through concrete beams, permission of the structural engineer shall be obtained and confirmed, and all such special conditions shall be clearly noted on drawings.
33. All information received from or given to the architect or owner, either directly or by telephone, shall be immediately confirmed by memorandum with a copy to all interested parties.
34. Detailed notes shall be taken at all job meetings and covering all items pertaining directly or indirectly to plumbing. After the meeting, a memorandum shall be written confirming all decisions, through the project manager, with a copy to all interested parties.
35. After a project has been scheduled and/or started, the job captain shall prepare a written memorandum containing information on any changes or additions, time involved in man-days and resultant delay in completion for all changes or additions, and obtain approval on this before proceeding with the job.
36. Where local practice requires it, check the riser diagram for fire or building departments.
37. Where required by local authorities, show the area in square feet drained by each leader and trap, and total of fixture units on house trap.

Final Check of Drawings

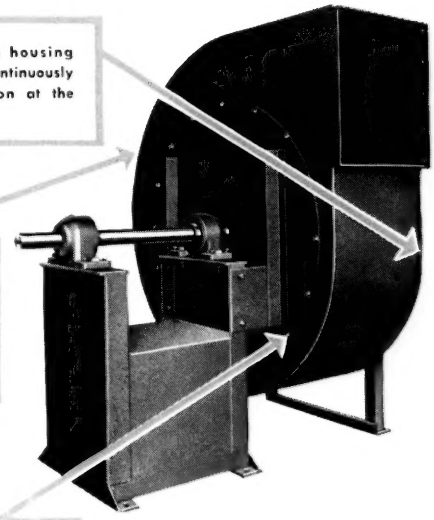
1. Show North on all plans.
2. Column numbers, room names and numbers on all plans.
3. Indicate floor elevations on first floor and basement or cellar floor plans.
4. Key to symbols.
5. Check for completeness of titles and title block and presence of firm stamp.
6. Reference notes between plans and risers, and between plan and plot plan.
7. Indicate elevations of house sewers leaving building.
8. Indicate sillcocks around building.
9. Check plans against risers for agreement of pipe sizing and location of vent and water branches, high or low.
10. Check plumbing plans against heating, ventilating and electrical plans for clearances.
11. Check that electrical designer has connected all motors and controls.
12. Check for agreement on motor controller locations.
13. Check that heating designer has connected up all hot water heaters.

Announcing

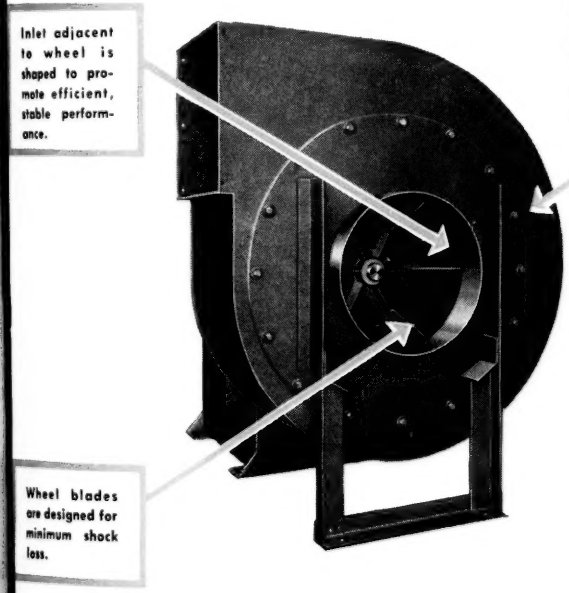
the new Clarage TYPE XL Industrial Fans

Exceptional Fan Equipment distinguished by:

1. High efficiency characteristic.
2. Rugged, tight construction.
3. Three interchangeable wheels — each with radial blades.
4. Large size range — 11″ through 60″ inlet diameters.
5. Pressures to 18″ SP; volumes to 130,000 CFM.


Heavy steel plate housing features a tight, continuously welded construction at the scroll.
Housing scientifically proportioned to minimize losses and maintain high fan efficiency.
Adjustable to any of eight standard discharges by merely removing tap bolts on each side and rotating the housing between the sideplates.

Type XL fans shown here are typical of the smaller sizes which provide universal discharge. Larger sizes are of reinforced sheet steel and base angle construction extending to the foundation line.


Inlet adjacent to wheel is shaped to promote efficient, stable performance.
Wheel blades are designed for minimum shock loss.

Send for Bulletin 702

A new, modern design offering many distinct advantages!

Clarage Type XL industrial fans are particularly well suited for diversified air and material handling applications. You'll profit from the high efficiency, in-the-field adaptability, and numerous other features of this exceptional fan equipment.

Learn more about these distinguishing features by requesting Bulletin 702, or contacting the nearest Clarage application engineering office.

CLARAGE FAN CO., Kalamazoo, Mich.

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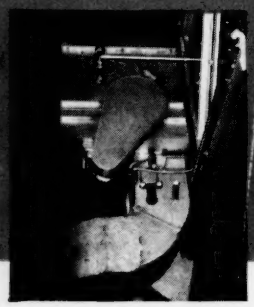
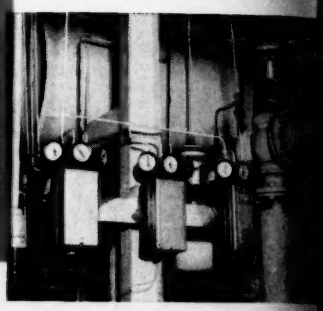
diversified temperature control problems CORRECTLY SOLVED by JOHNSON

Tinnerman Products, Inc., Cleveland, Ohio. McGeorge-Hargett & Associates, architects; Wm. Hargett, mechanical engineer; Feldman Brothers Co., mechanical contractors, all of Cleveland.

In offices, perfect working weather the year 'round is insured by Johnson Room Thermostats which operate mixing dampers on central fan air conditioning units.



Central fan heating and ventilating units in the factory are controlled by Johnson T-316 Insertion Thermostats measuring the temperature of the fan discharge air and operating Johnson Damper Operators on face and bypass dampers.



Weather-compensated Johnson T-901 Submaster Thermostats regulate 3-Way Mixing Valves on the hot water supply for radiant heating coils and convectors.

More than 8,000 shapes and sizes of fastening devices, including famous Speed Nuts, are produced by Tinnerman Products, Inc. Among the many up-to-the-minute facilities designed to insure optimum working conditions in this progressive company's modern plant and office building is a specially planned system of Johnson Automatic Temperature Control.

Temperature regulation problems include the control of four central fan air conditioning systems serving the office section and lobby, radiant floor panels in the lobby, hot water convectors in offices and other spaces, and central fan heating and ventilating systems serving manufacturing areas. Each of the varied requirements of the different systems, and the working spaces served by each, is met with precision by properly appli Johnson apparatus.

This installation, like every Johnson System, w planned, made and installed by Johnson to meet th exact needs of the individual control problems en countered, thus insuring the desired results at th lowest possible operating cost.

Any building—small or large, new or existing—ca enjoy the superior comfort and economy features Johnson Control. Ask an engineer from a near Johnson branch to make a survey of your problem. H will gladly submit recommendations without oblig tion. JOHNSON SERVICE COMPANY, Milwaukee 2 Wisconsin. Direct Branch Offices in Principal Citie

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